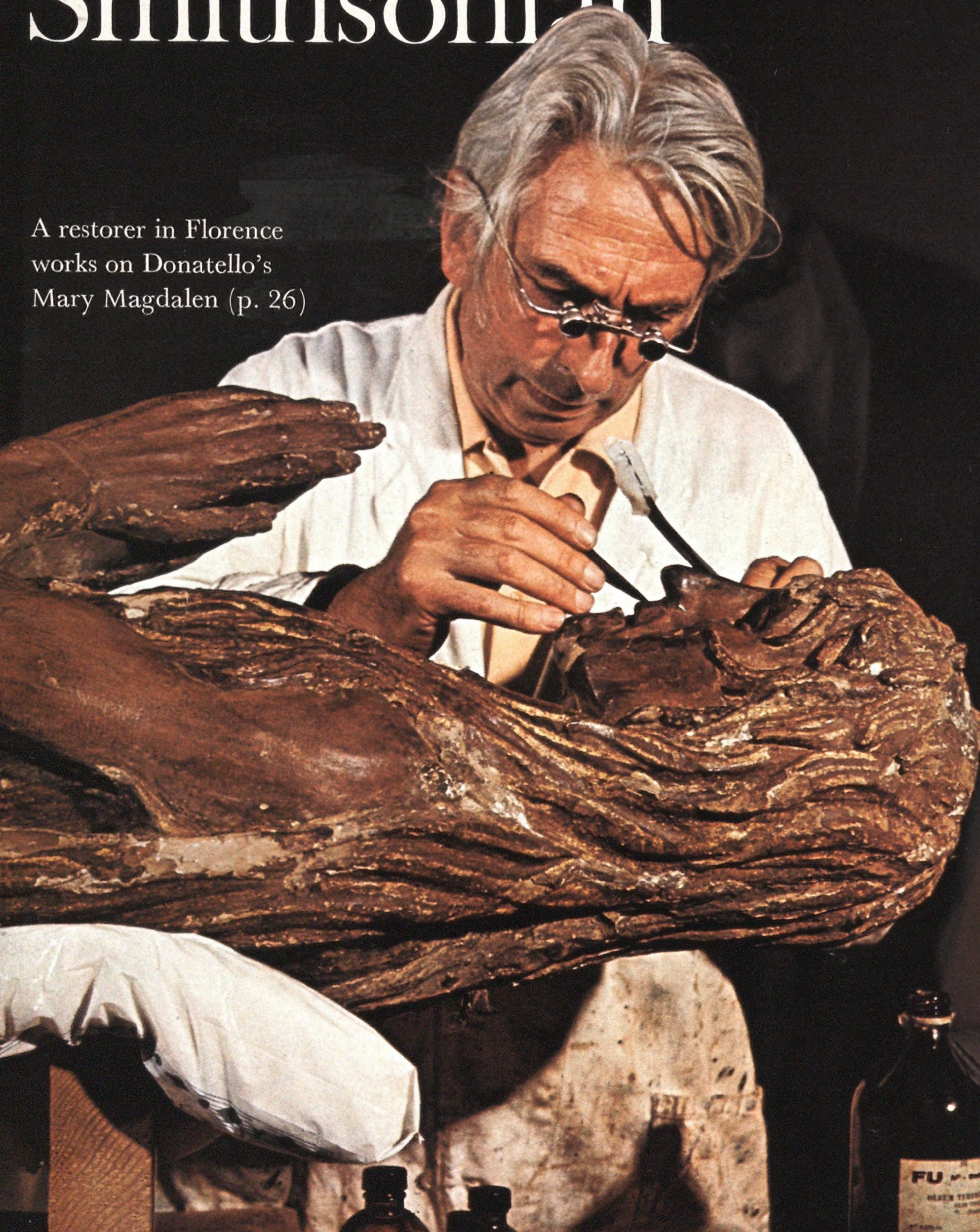
February 1974

Smithsonian

A restorer in Florence works on Donatello's Mary Magdalen (p. 26)



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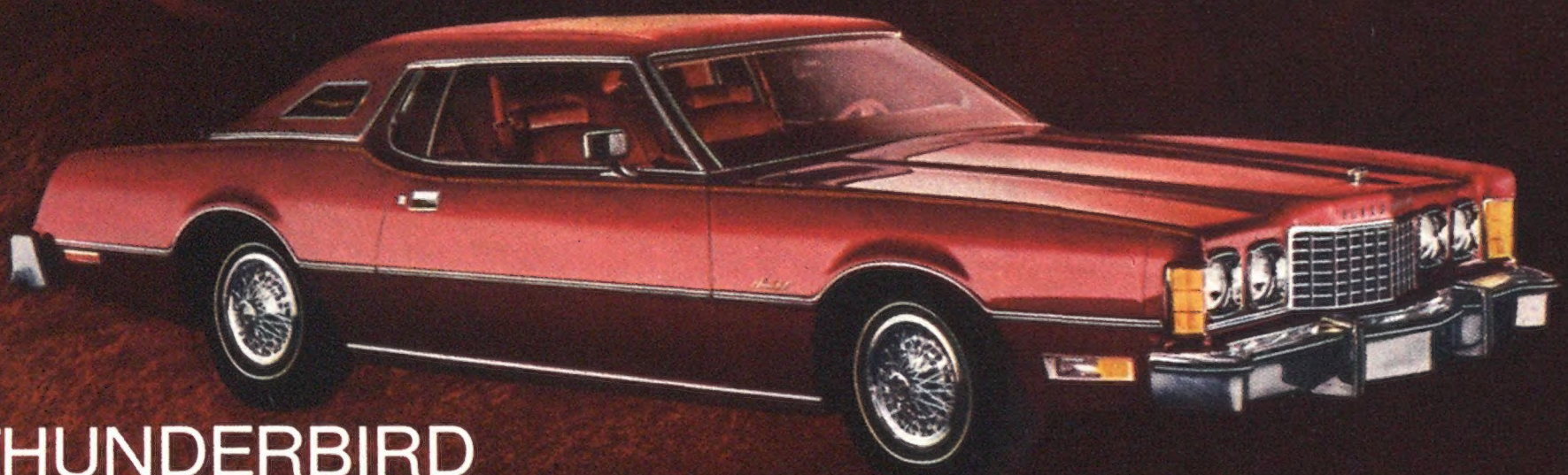

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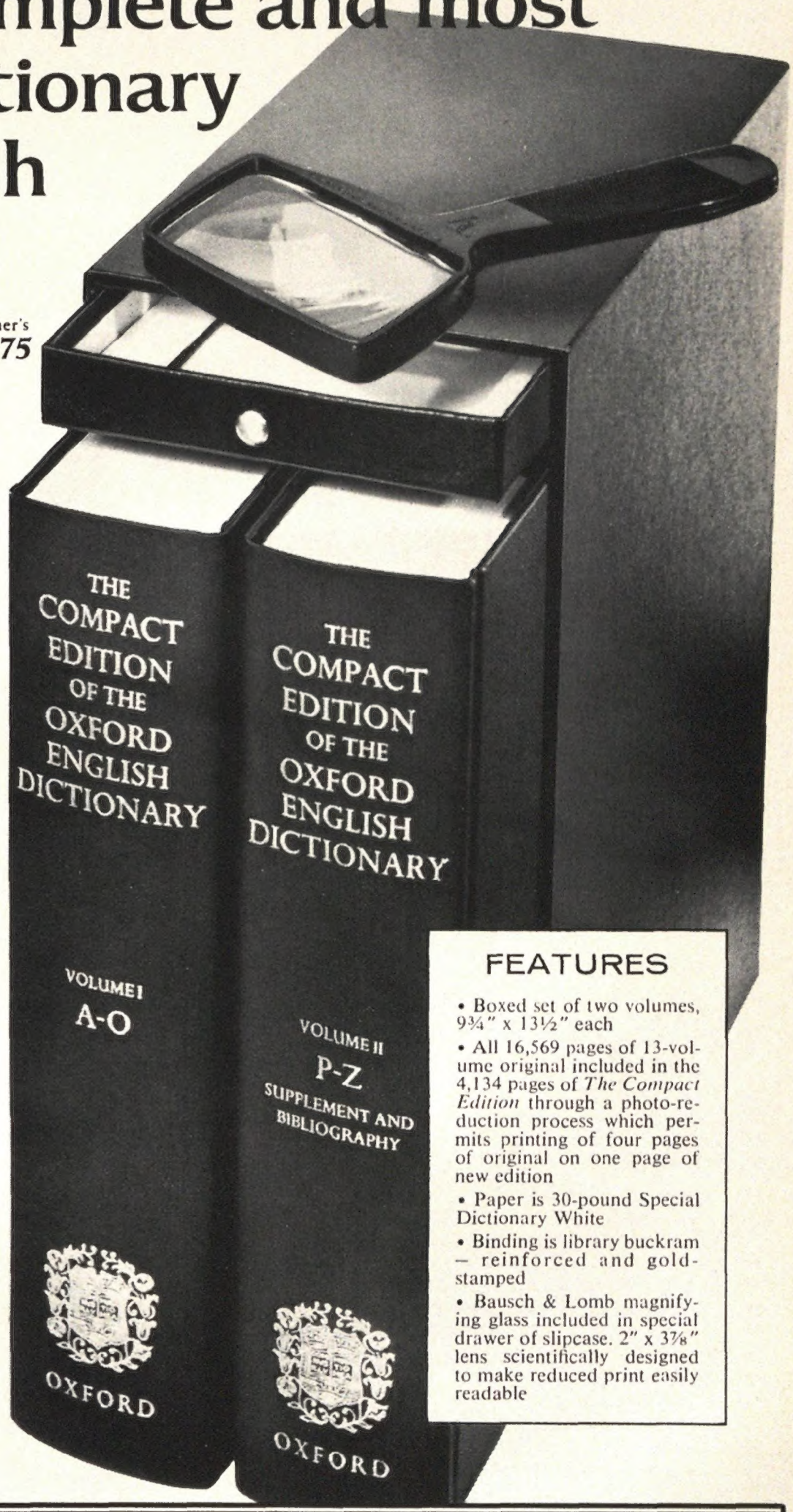

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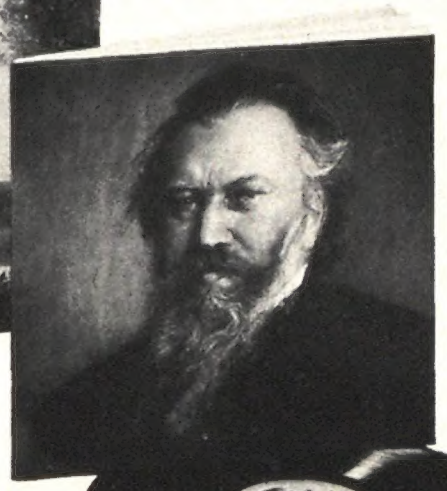

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Secretary Ripley's comments

The view from the castle

The late Charles Greeley Abbot–inventor, solar authority, astrophysicist, singer– was the fifth secretary of the Institution

In 1970, Soviet delegates to the International Astronomical Union proposed that a crater on the near side of the moon be named in honor of a U.S. citizen, Charles Greeley Abbot. The only hitch, an American pointed out, was that Dr. Abbot was alive and well and the names of lunar features were, with the exception of astronauts, reserved exclusively for late greats such as Newton, Galileo and Copernicus. An exception was made, however, and last August at a subsequent meeting, the lunar crater, Apollonius K, was especially renamed for Dr. Abbot.

It was an appropriate honor. In 1915, when Dr. Abbot was working under his second Smithsonian secretary, he perceived the promise of a relatively obscure engineer from Massachusetts and was instrumental in helping him obtain funds to continue his research. The engineer was R. H. Goddard, generally considered the father of the modern rocket.

Dr. Abbot himself (see SMITHSONIAN, October 1970 and July 1973) was an astrophysicist who pioneered in the study of the sun. Around the turn of the century he began analyzing the intensity of solar radiation. In 1943 he wrote (with foresight we are all beginning to appreciate): "When our present supply of coal and oil is exhausted, the daily ration of solar energy will represent almost the entire means of livelihood." Almost 30 years later, in 1972, he became what is believed to be the oldest person ever to receive a U.S. patent—for an improvement on a device for harnessing solar energy that he had invented originally in 1938.

His life spanned the history of aviation. Years ago he stood atop the Smithsonian castle and watched the first attempts at powered flight over the Potomac River. As the Institution's fifth secretary, he brought the Wright brothers' plane to Washington. Recently he was among those welcoming the astronauts who presented a sample of lunar rocks to the Institution.

Last November, Dr. Abbot took the podium at a meteorological symposium sponsored in his honor by the National Aeronautics and Space Administration. He said: "There are wonderful events coming that we cannot even imagine at this time. . . . I'm very glad to have lived between 1870 and 1970."

That Dr. Abbot has died at 101 seems a surprise. Losing him, especially so soon after losing another dear colleague, Leonard Carmichael, is a great blow to the Smithsonian family. His recollections, as a man born before the Republic itself was a century old and when the Smithsonian was only 26 years old, were continually fascinating to me. He was a merry man in the old-fashioned sense of the word. His outlook was young, his phrases couched in a style that was forthright yet still with the authentic ring of a bygone, more literate age.

He loved music with a passion and sang both church hymns and sea chanteys with relish. Last year, at a concert in honor of Copernicus' 500th anniversary, when the music performed was fashionably contemporary and dissonant, I asked Dr. Abbot what he thought of it. He looked at me with the conviction of someone who had known what he liked since he began singing in the 1880s, smiled and said:

"I think it's perfectly outrageous."

S. Dillon Ripley

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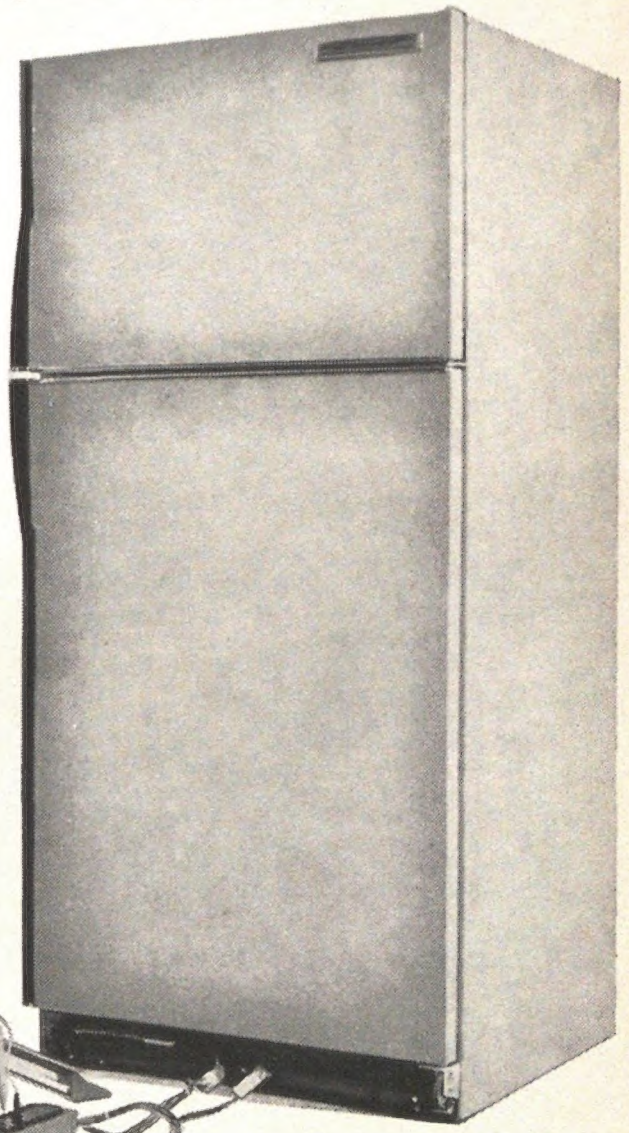

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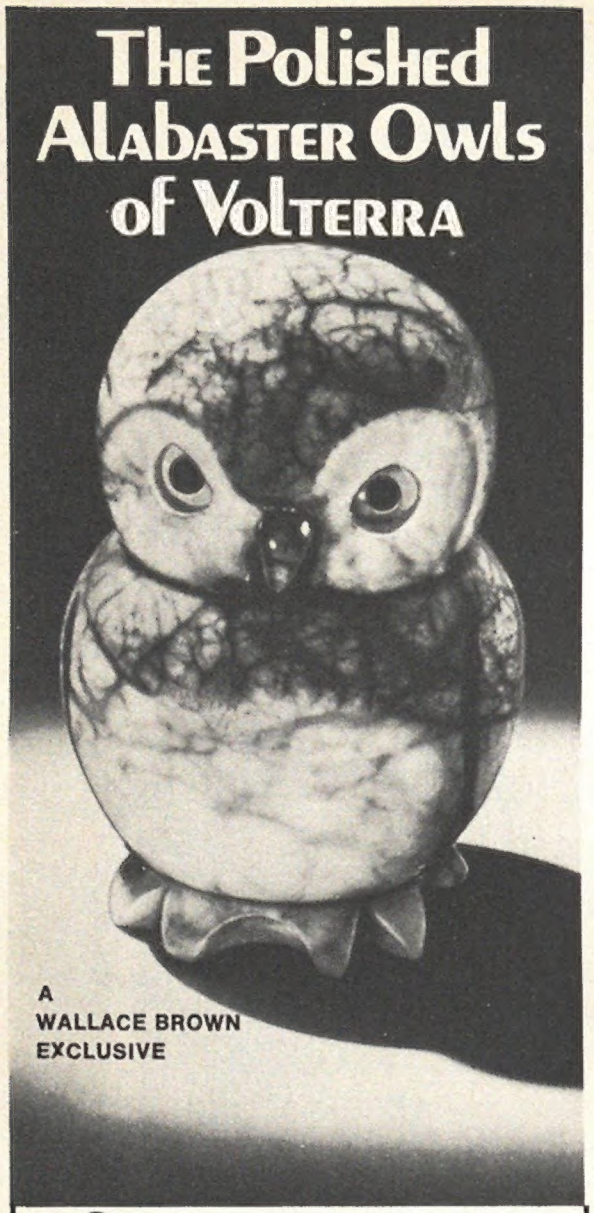

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Phenomena, comment and notes

Duck eggs as curatives, flywheels as gas tanks, caterpillars and slugs, and SMITHSONIAN *as food for thought*

Most people don't eat magazines but magazines and newspapers are among the occasional additives to the diets of tiny children, as are dirt, leaves, safety pins and paint chips. And like paint chips, the ink used in magazines often contains lead, according to a study by the Connecticut Agricultural Experiment Station, published in *Clinical Pediatrics*. The study showed that the color pages of some glossy magazines and some newspaper advertising inserts are the highest in lead content among various kinds of printed material—some yellow inks tested contain 29,000 parts of lead per million. A child who regularly ingests the pretty, colorful pictures could eventually become seriously ill. (Regular newspapers and comics are not anywhere near as toxic.)

We were relieved to find that the lead content of the ink in SMITHSONIAN is zero, so there is no need to keep this magazine away from toddlers (no reader should be discouraged). We would, however, prefer that it be passed along to a friend rather than eaten.

Monks gone wild

The problem with monk parakeets is that they aren't monkish enough.

Drafted in the thousands to serve as North American pets, these sociable gray, green and blue inhabitants of South America have the unfortunate trait of adaptability. Escapees—and beneficiaries of tender-hearted or disappointed owners who have released them—are doing fine in the wild in some 22 states according to *Science News*.

The feral communes of monk parakeets are still few here, but in their native lands the birds are known to be extremely serious agricultural pests. Localized damage to U.S. fruit and decorative trees near parakeet nests has already been reported. Observers are worried that the parakeets might repeat the history of a detested immigrant brought to these shores a century ago for the slightly more noble reason that it was mentioned in Shakespeare's writings: the starling.

Biology sees a who—or what?

To anyone who wandered into the zoology department at the University of Wisconsin at Madison, it would have seemed like a case of cheerful mass lunacy, an early sign of collapse in the biological supply business, or a not-very-subtle bit of satire: A class in animal behavior spent several days engaged in observing and analyzing the behavior of a stuffed toy.

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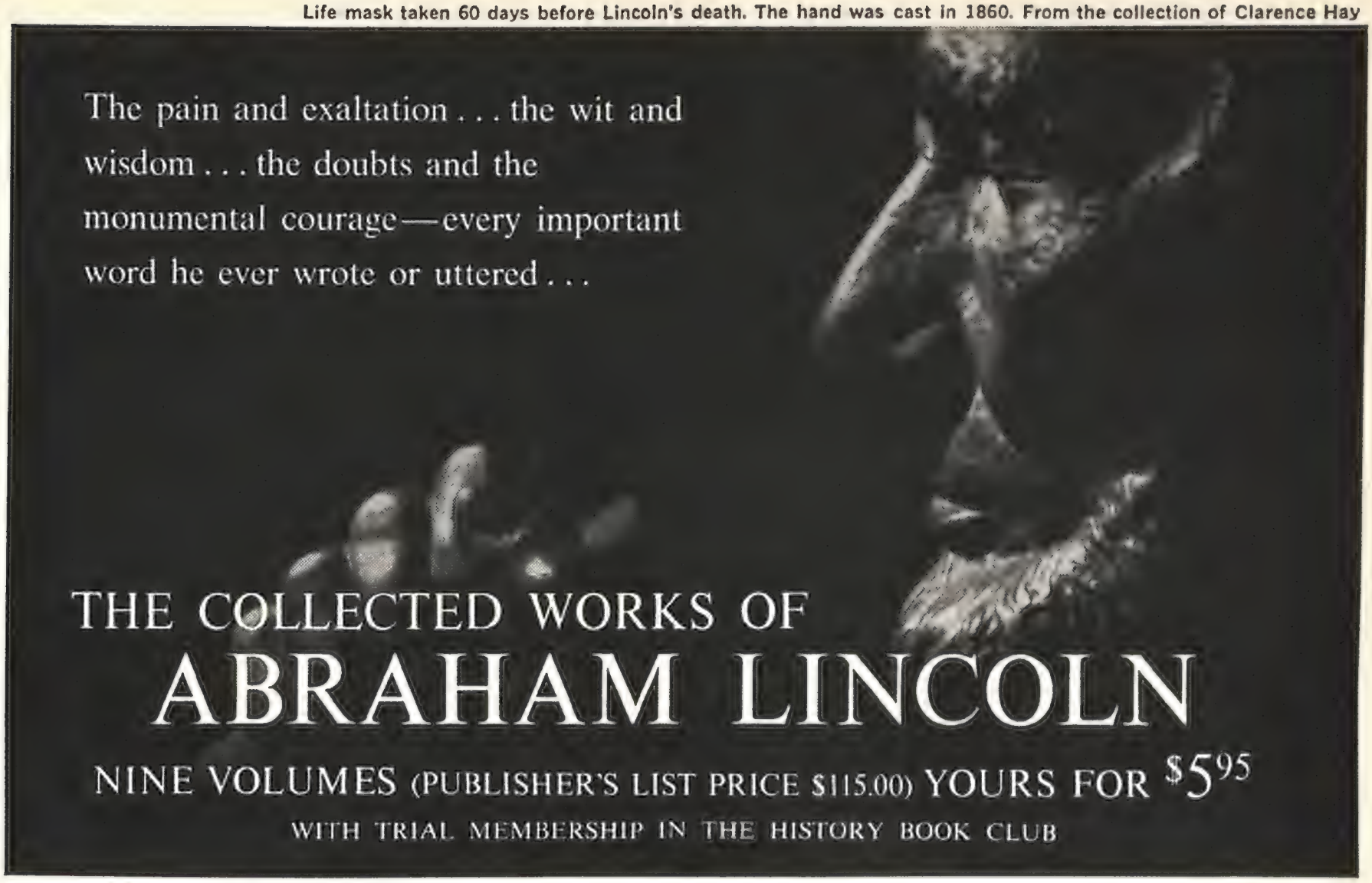
Dr. Seuss' well-known but previously unstudied character Horton (see above) is available as a toy, and Horton talks. Pull his string, and he will say one of ten sentences—such as "A person's a person, no matter how small"—in an apparently haphazard order. Reasoning that such behavior is not unlike the singing of birds,

Life mask taken 60 days before Lincoln's death. The hand was cast in 1860. From the collection of Clarence Hay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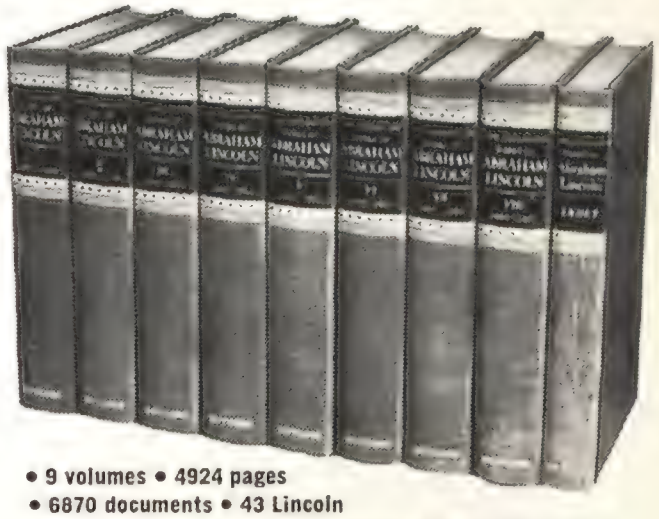

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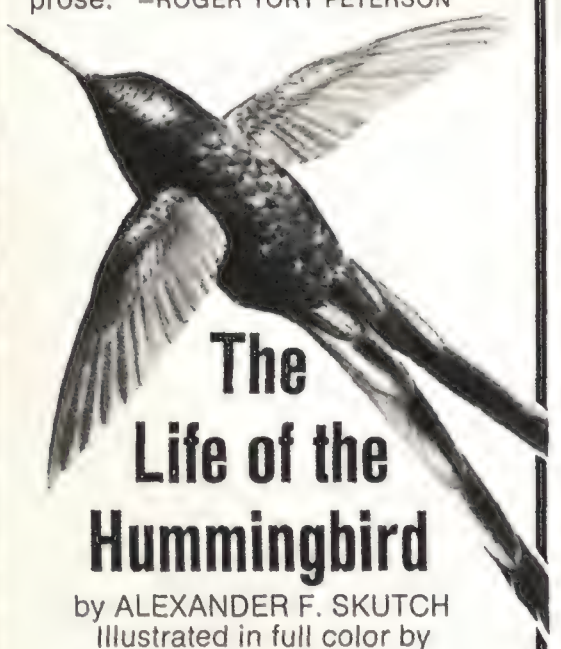

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two zoologists, Jack P. Hailman and B. Dennis Sustare, had their students pull Horton's string thousands of times and, using elaborate statistical tools as well as a computer, determined the patterns of Horton's limited conversation. Not that anyone cares much about Horton's behavior—the zoologists write in *Bioscience* that they were merely using him "in teaching the analytic power of biological observation."

Clearly, as Horton would say, an experimental animal's an experimental animal, no matter how unlikely.

A natural question

A Smithsonian Associate, Richard Jackman of New Castle, Indiana, has asked a question of nature that could possibly supply some goal-less graduate student with a dissertation topic. Mr. Jackman is puzzled by "the fall migration of caterpillars . . . to the other side of the road."

He hastens to point out that this often observed phenomenon is probably no true migration since the caterpillars are always seen traveling alone. "What is most noteworthy," he writes challengingly, "is that they are always traversing a straight line across the road. I have never seen one which seems to be disoriented or is deviating from a path perpendicular to the parallel edges of the road or, where there is a curve in the road, from a line perpendicular to tangents to the concentric sides."

Phrased thus, the problem could be worth a sizable grant.

Lowly model

You may think that not much of use to mankind would arise from an analysis of caterpillar guidance systems, but who knows? The locomotion of the slug would seem to be a dead-end topic, too, but it was clearly the slug that inspired Claudius Dornier of Munich.

Mr. Dornier sought a better way to move boats overland for short distances without wheels or ramps. His idea, as reported in *New Scientist,* is a boat containing a tank from which a "viscous, slimy fluid, such as foam, soap or oil" would be expelled, forming a slippery surface on the lower part of the hull. Such a scheme would also help the hapless yachtsman who runs aground. Mr. Dornier goes on to suggest the same prin-

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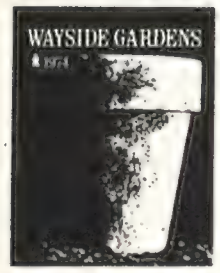

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ciple for trucks that are required to traverse rough ground: wheels in front and a slime generator in the rear.

It might be a bit hard to sell the public a pleasure boat—or anything else—modeled on a slug and, come to think of it, a slugmobile sounds like just one more addition to our already adequate supply of polluters. It's probably a better idea to study caterpillar migration.

Flywheels

We like to think of Americans as highly inventive, especially when faced with crises. And the notion of abandoning cars for shanks' mare is enough of a crisis to set a lot of Americans thinking. Ideas for reducing the energy consumption of cars are proliferating at a dizzying pace.

One such idea derives from a principle well known to potters since ancient times—the flywheel. A father-and-son team, Richard F. and Stephen F. Post, writes in *Scientific American* that flywheels made of new light materials developed in space research could provide us with the ideal energy storage and delivery systems needed to make the electric car feasible.

A 130-pound flywheel, they estimate, would store the equivalent energy of 2,000 pounds of lead-acid batteries and a five-minute charge from an electricity source would provide the juice for a 200-mile ride. Pollution from such cars would be near zero and since electricity-producing power plants are far more efficient than internal combustion engines, fossil fuel consumed per vehicle mile would be about five times lower in a flywheel car. Thus there would also be far less pollution overall, and it would be centralized, therefore admitting of easier control.

Is folk medicine batty?

Folk medicine—the use of natural herbs and other plants as remedies—is no laughing matter, judging from an article in *Medical World News*. Many doctors believe it to be anywhere from harmless to dangerous, a main problem being the absence of quality control as with street-sold LSD. Nevertheless, folk remedies are increasingly popular—particularly among the young—and there are a number of doctors who happily prescribe such things as sassafras poultices and lungwort tea for various ailments, on the theory that people who do something for themselves

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are inclined to have healthier life-styles. Maybe, also, as the drug companies get less of the petroleum products they so heavily depend on, we will all have to learn a bit more about coltsfoot and comfrey leaves and ginseng.

Medical World News quotes one sore-throat remedy, however, that unquestionably will not make the medical big time: "One source of natural penicillin is ancient (preserved) duck eggs. These are eggs that have been buried at least six months in bat guano. If you mix them with a tbsp of soy sauce and a tbsp of oil, add some salt, ginger and lemon juice, they are delicious." Sure.

Trafficking in holidays

How much time have you set aside to reflect on the life of George Washington when his birthday is celebrated this month? Probably none: Washington's birthday is of interest mainly to those retail stores which stay open.

We probably shouldn't celebrate it at all. That is not to say that people (including retailers) don't need holidays—they do, and holidays that make three-day weekends are for many people the best kind. There is indeed a trend toward making national holidays fall on the day before or after weekends, regardless of the date of the real event being celebrated, so why not go all the way? Declare one holiday a month, 12 in all, and every year pick a new set of birthdays to celebrate.

Take February. Galileo was born this month, as were Charles Dickens, Charles Darwin, Thomas Edison, Angelina Grimké, Frederick Douglass, Victor Hugo . . . the list goes on and on.

Or take March: Michelangelo, Einstein, Robert Frost and Teresa of Avila.

Why not celebrate Gandhi's birthday this year instead of an Armistice Day, renamed "Veterans Day," that has been misplaced in October? Or it could be Virgil or Nietzsche. A lot of people might say, Who? Who is that Angelina Grimké? And that is precisely the point. In the course of a few years, a lot of people would have learned a good deal about the course of human civilization that they didn't know before.

Then maybe one February far in the future we perhaps would be ready to celebrate—really celebrate—the birthday of George Washington.

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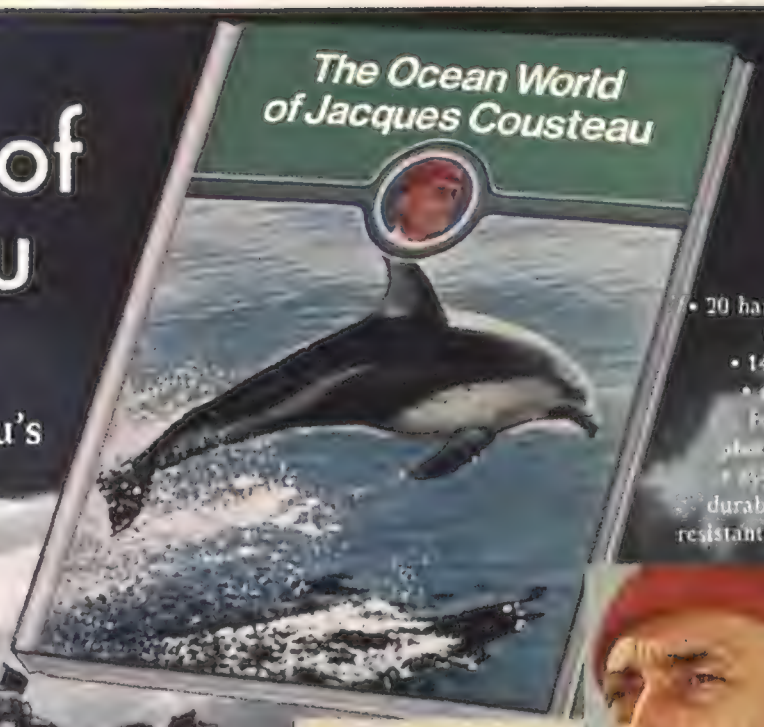

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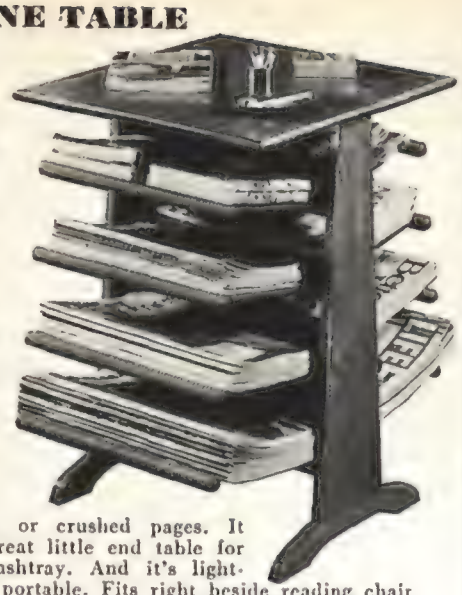

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[*There is, of course, no obligation*]

Letters to the Editor

White House Toys

Dear Sir: I am sure that the "earless and stringy-tailed" wooden tiger mentioned in your December article on White House toys is a member of Schoenhut's unique Humpty Dumpty Circus [see below]. Many of their best were made with leather ears and hempen tails, and my father became expert at replacing parts of over-loved members of my circus.

Alas, I never had the tiger, but knowing that Dean Sayre still treasures his is almost enough to return this apostate Episcopalian and Schoenhut freak back to the fold.

Suzanne W. Edmonston
Pomona, California

Dean Sayre's tiger appears to be identical with the Schoenhut version. Ed.

Dear Sir: Sally, the White House doll featured on your cover, looks very much like a Greiner doll manufactured by a German in Philadelphia. The head is papier mâché and the body stuffed. I have one in perfect condition.

Lotta K. de MaCarty
Litchfield, Connecticut

Dear Sir: My daughter and I enjoyed reading your article on White House toys, but we question your description of the doll called Sally. As authors of *The Collector's Encyclopedia of Dolls,* we have spent years studying antique dolls.

A careful analysis of the doll Sally indicates that the head probably dates from the 1850s when the *daughters* of Mary Louisa Adams Johnson would have been playing with dolls. The head resembles

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the style of head patented by Greiner in 1858. The body could be earlier, suggesting a possible decapitation. If so, it is only part of the doll once played with by Mary Louisa herself.
Dorothy S. Coleman
Washington, D.C.
Various references to the doll in the 1890s indicate that Sally is indeed the famous White House doll. Smithsonian curators assume that the new head was put on for Mary Louisa's children. Ed.

Dear Sir: We of the President Benjamin Harrison Memorial Home were interested in the types of toys used by the children of the past who, for a short time, called the White House home.

I enjoyed especially the story of Tad Lincoln and his favorite doll, Jack, whom he executed so often with his toy cannon.

The pictures of the Harrison dolls were well displayed and most attractive. They are a great addition to our collection of memorabilia.
Lois L. Childers
Indianapolis, Indiana

Pandora's box of fission

Dear Sir: In your article, "World-Shaking week in December," the following statement is incorrect: "In its most plentiful form, or isotope, uranium has an atomic number of 92, which means it has 92 protons and 92 neutrons in its nucleus." In fact, the atomic number of an element specifies only the number of protons in an atom of that element, and has nothing to say about the number of neutrons present.

All forms, or isotopes, of uranium contain 92 protons, but they differ in the number of neutrons. An atom of uranium-235 has 92 protons and 143 neutrons; an atom of uranium-238 has 92 protons and 146 neutrons. Atoms of the same atomic number, but different masses, behave very differently indeed in nuclear reactions—an important point when dealing with uranium.
Edna W. Paulson
Frederick, Maryland
Ms. Paulson and others who called this to our attention are correct. Ed.

Dear Sir: Having resided in Berlin through mid-April 1939, I found Kurt Stehling's report on the work in a quiet lab near Berlin and a walk in the snow in Sweden that opened up the Pandora's

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box of fission most interesting—especially since I acquired an interest in biomedical research in space flight with Wernher von Braun.

It is interesting to note that Einstein in his famous letter to President Roosevelt, which you quoted, made no mention of the basic research of Otto Hahn and his assistant, Lise Meitner. The greatest surprise regarding Einstein occurred at an AAAS meeting in Pittsburgh in 1934 when he gave his paper, "An Elementary Proof of the Theorem Concerning the Equivalence of Mass and Energy." He specified at that time that he would address no more than 400 persons because "no more would understand." (Some scientists were peddling their seats at $50 a pair.) During the meeting Einstein said, "I am not a prophet, but I feel absolutely sure, nearly sure, that it will not be possible to convert matter into energy for practical purposes."

It is a historical irony that the letter to FDR led to the splitting of the atom at Alamogordo, New Mexico, on July 16, 1945, with the holocausts of Hiroshima and Nagasaki following in August.

Dr. Constantine D.J. Generales jr.
New York City

Left and right

Dear Sir: Daniel Jack Chasan's article, "Left and right, more than military," left me with an unanswered question concerning Siamese Cats. The author states that the brain is divided into the right and left cerebral hemispheres, that all information received from the right side of the visual field is processed through the left side, and vice versa. Then he adds, without explanation: "This is true in all higher animals with the exception of Siamese cats, which seem to be wired up rather eccentrically."

As the owner of two eccentric Siamese cats, I would welcome an explanation, which might bring a little more harmony into what, at times, is a chaotic home.

Diana G. Heimann
Pasadena, California

Dr. Rainer Guillery of the Department of Anatomy at the University of Wisconsin in Madison reports that his study of 40 subspecies of Siamese cats has shown that they have abnormal visual pathways and experience what is called "partial crossing." The abnormality occurs in those animals lacking retinal pigment. Ed.

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Her recipe for Supreme de Volaille called for carefully removing all the fat from the tender meat.

A trace of fat would cause the sauce supreme to spot. "You have ruined my Volaille," she said. For no knife satisfied her with its truth of edge.

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In fact, that is the way we guarantee these remarkable knives. Should you ever need a replacement for any reason, simply return the knife, and a new knife will be sent to you, at no cost to you.

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I make no pretense of low price for this knife. It is not, by any means, the world's most inexpensive knife set. Yet when you consider it as a lifetime investment, its value takes real meaning.

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A one pound ball has been dropped on this from 6 feet to test the strength of the Rosewood handle.

A weight of 20 pounds was suspended on the blade to test its tensile strength.

A ham bone was used in extensive tests to determine the resistance of the blade to nicking.

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200 years ago this month

Washington, turning 42, sees his stepson wed

FEBRUARY 1774

Early on the third day of this month, George Washington braves the wintry Potomac River in his man-powered tent boat. He is rowed across to the Maryland shore to attend his stepson's wedding.

Ever a trial when it came to schooling, Jacky Custis had dawdled and drifted while being taught by the Rev. Jonathan Boucher of Annapolis—and, it turned out, paid far more attention to Nelly Calvert than to his Greek and Latin. When he announced his intention to marry Miss Nelly, his stepfather was shocked; his mother, still shattered by her daughter's death early in the summer, simply dithered. Hoping to defer the marriage—which he confessed was a highly desirable one (after all, the Calverts of Maryland were quite something)—George Washington entered his stepson in King's College [later Columbia] in New York.

It didn't take. Jacky dropped out of college last December, and Washington, apparently with good grace, now sees the boy married to his Nelly. He remains two days at the Calvert estate, Mount Airy, feasting and toasting, before bobbing back across the bleak river to Mount Vernon and his familiar problems of hound breeding and seeing to the building of a nearby church. It is completed just after his 42nd birthday.

The farm is quiet in the Virginia winter, and little outside news disturbs the Colonel. He is aware of the Boston Tea Party and thinks it was wrong and stupid —and very far away. How much more im-

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Steel the recycled material

Tinplate Producers American Iron and Steel Institute

mediate is the business of land grants on the western frontier, of Lord Dunmore's dealings with the Shawnees, of Jack's prospects, minus education but plus bride.

Formal schooling may push a lad too much as well as too little. Take the precocious grandson of the great New England divine, Jonathan Edwards. The boy graduated from the College of New Jersey in 1772, is now considering reading law and this month turns 18. Name: Aaron Burr.

The heavily forested land south of Philadelphia is broken only by a few great plantations and small villages. Virginia boasts no cities. Only Charleston deserves the word—an urban island in a wilderness, nearly cut off from other centers by land, its seaborne communications uncertain at this time of year when storms rage around Cape Hatteras.

Isolation alters the Charlestonians' view of American Colonial problems. These people are a little different in background, too: Barbadian planters, French Huguenots, as well as Cavalier English. Their plantations are vast, run by armies of slaves, often lavishly ornamented with semitropical gardens, topiary hedges, still pools shaded by live oaks. The planters built their city to escape the heat and disease of summer in the swampy rice-growing land. Merchants fattened on the port. And when the tea arrived in December, these pleasant, urbane Charlestonians with their gentle and purist speech could not agree what to do with it. The merchants were for militant action; the planters, dependent on British favors for marketing their rice and indigo, were for moderation—bar the dutiable tea, but leave doors open.

This gentlemanly dispute resulted in the tea being unloaded, but without consignees. It is now going bad in the February damp.

In damp and foggy London, King George's ministers are meeting and discussing how to deal with the outrageous Colonials in Boston. Legal opinion brands the tea party as "the levying of war against His Majesty." Stern punishment is in order. It is impossible to single out individuals for indictment, so the Crown's vengeance will fall on the whole town. After all, says one Englishman, Bostonians are "the most truly immoral Men."

EDWARDS PARK

Next month: The wrecked brig: a tale of courage—and greed.

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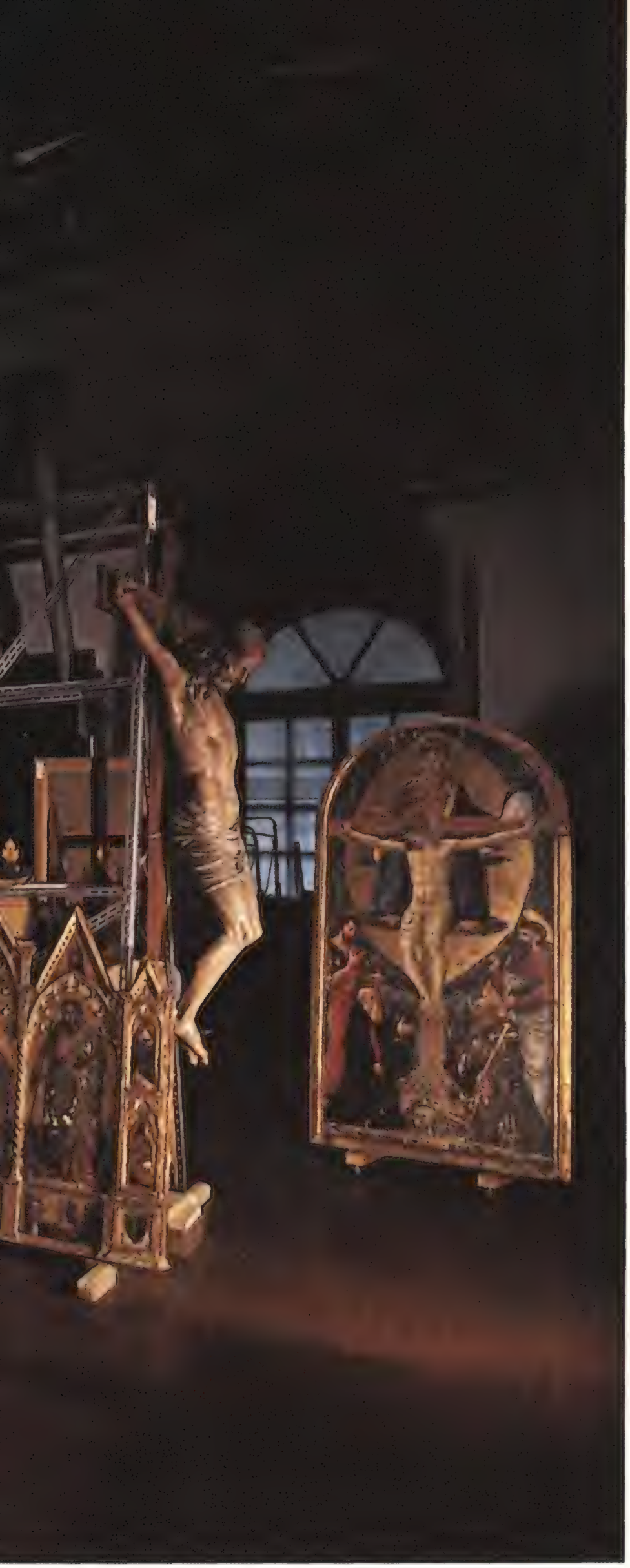
Ailing works of art in need of attention (note condition of the altarpiece at right center) are lined up to await their turn in the "operating theater" of Florence's restoration laboratory.



Photographs by David Lees

By Dora Jane Hamblin

Science finds way to restore the art damage in Florence

Spurred by the severe flood damage of 1966, chemists and restorers have joined to write a new chapter in art conservation

On November 4, 1966, the normally docile little Arno river roared out of its banks in Florence and drowned hundreds of the works which the West worships as the epitome of the artistic Renaissance.

The towering *Crucifix* of Cimabue (pp. 30-31), the 13th-century artist whom Florentines call "the father of the father of the Renaissance," was up to its holy armpits in muddy water inside the church of Santa Croce. Turgid floods poured around the legs of Donatello's wooden Mary Magdalen (cover and p. 29) in the Baptistery, and tore at the backing of the bronze panels of Ghiberti's great doors facing the black-and-white-striped Duomo and Giotto's bell tower. Frescoes, wooden triptychs, canvases and sculptures were swept away by the water or plunged into the rising muck.

Human life was the first concern but in all the world, including stricken Florence, there was an urgent, anguished cry to save the art. Rescue the old lady if you can, but catch that floating masterpiece with your other hand, was the spirit of the day.

After a stunned, horrified moment—how could the Almighty destroy the works which so glorified Him on Earth?—the world rallied to Florence. Hitherto-maligned youngsters with long hair and dirty blue jeans, speaking a babble of languages, materialized

Dora Jane Hamblin lives in Italy. Her most recent article in SMITHSONIAN *was on the marble "jigsaw puzzle" at Sperlonga (February 1973).*

Edo Masini (foreground) works on a Giotto under heat/humidity conduit in the main laboratory.

from their pads and caves to man broom and shovel, shoulder crucifixes or lay tenderly on drying racks the drenched pages of ancient manuscripts.

Art experts and restorers and students poured into Florence from every civilized nation, proffering skilled hands and knowledge. Money came—and, perhaps most important of all, science came and was converted and has stayed on to help.

Now Florence's *Laboratorio del Restauro* has become the largest and operationally best-equipped in Italy (the leading research center is still Rome), thus probably in the world. A nucleus of 30 pre-flood restorers and technicians has grown to a skilled staff of more than 70, including some foreigners who spend months both teaching and learning in the gigantic "art hospital" set up in a former military barracks near the railway station.

From the greatest artistic disaster of modern times has grown, phoenixlike, a whole new chapter in the

Workman puts finishing touches on a section of Fra Angelico's *Crucifixion* fresco in the monastery of San Marco. Once obscured by whitish gypsum deposit, restored colors are now fresh and clear.

art of art conservation and restoration. One of the scientific discoveries is described by Umberto Baldini, director of the restoration laboratories, as "the most important in our field in the last 100 years—perhaps the most important ever." Professor Baldini is not a man given to hyperbole.

The near-miracle of which Baldini speaks is a carefully researched chemical attack upon degradation in ancient frescoes, a "restoration" in the true sense of the word: The fresco is not altered, not repainted, not sealed, but is restored to its original brilliance and solidity by reversing the chemical processes of degradation and returning the various materials to their original components.

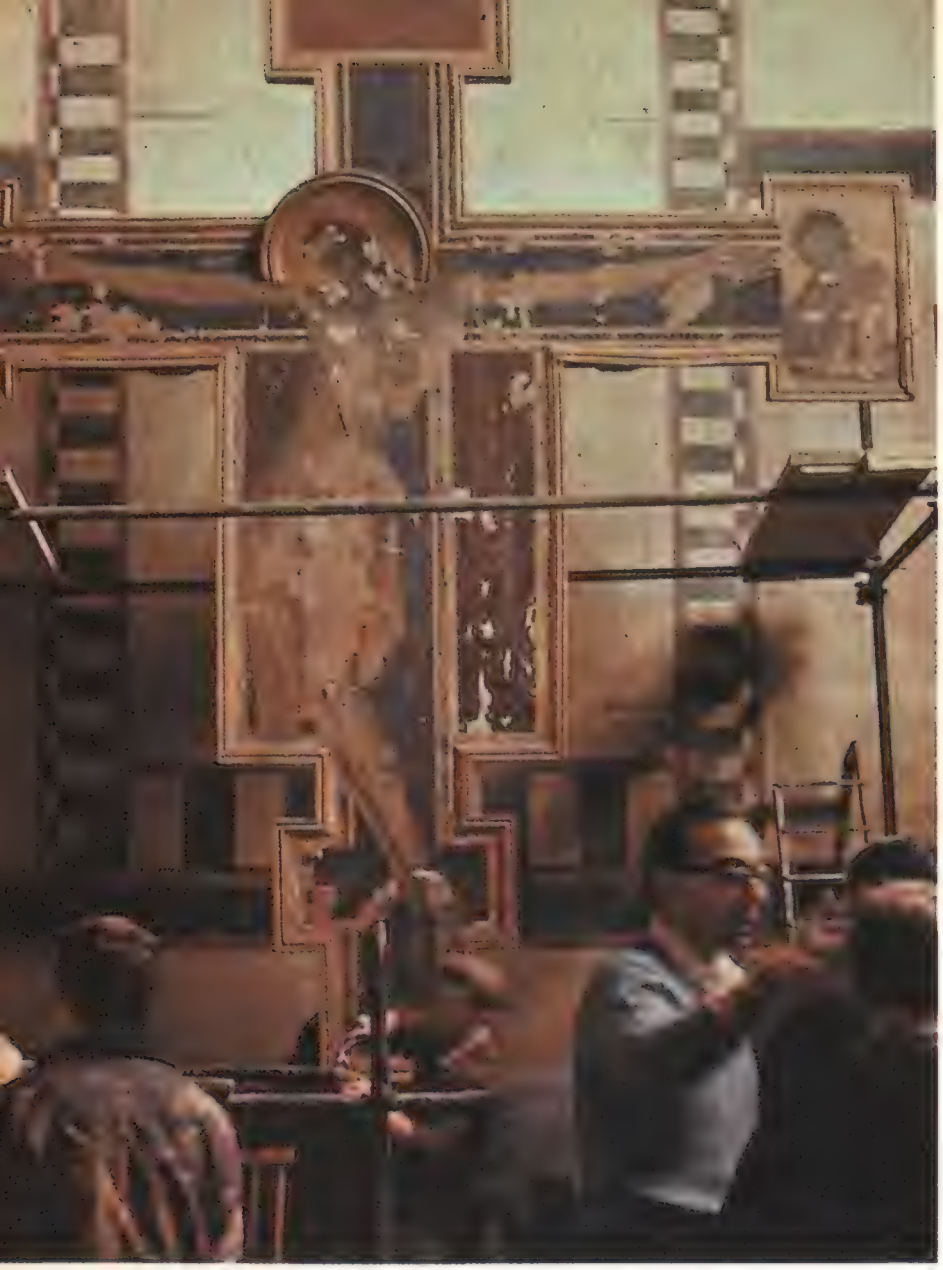
Fresco diseases were most dramatically exhibited in Florence in the monastery of San Marco, which did not suffer any flood damage. Yet here the great *Crucifixion* of Fra Angelico had developed a whitish "veil" which obscured the colors. Worse still, it had a sort of measles, a disease which produced millions of microscopic pimples, from the point of each of which a tiny flake of paint eventually fell off. Some lesser, though still priceless, frescoes by Giovanni Antonio Sogliani at San Marco were totally obscured by the white veil, a powdery growth more than a millimeter thick at the bottom of the work.

Both veil and pimples turned out to be products of a gypsum formation chemically described as $CaSO_4 \cdot 2H_2O$ (calcium sulfate with two water molecules). In simplest terms, what had happened was that calcium carbonate ($CaCO_3$), a normal component of the plaster base of frescoes, had turned into a crystalline calcium sulfate. The points of the crystals were the pimples, the veil was a deposit formed in the chemical change. Just how and why this transformation occurred is still not clear, although it seems to have been a centuries-long process with a number of contributing factors: moisture, the sulfur in the egg yolk with which pigments were often mixed and, especially, the sulfuric compounds in present-day industrial exhalants and automobile exhaust fumes.

Bright and clear again

Once the villain was identified, the plan for the counterattack was clear: Somehow the calcium sulfate had to be induced to change itself back into calcium carbonate. The change would remove the veil and encourage the little pimples to collapse back inward, carrying with them the precious film of paint. After a year of research and analysis, the right reactive agents were found: first, a solution of ammonium carbonate, which attacks the gypsum crystals and transforms them into $CaCO_3$, then an application of barium hydrate, which results in the formation of barium sulfate

Restorers removed heavy coat of brown paint from Donatello's *Mary Magdalen* to reveal original surface.



Cimabue's great *Crucifix,* shown above after water receded, was 75 percent damaged by the flood.

($BaSO_4$). The latter is inert and insoluble in water. When the reaction was completed, the surface calcium sulfate had vanished and the frescoes emerged bright and clear and hard. The "medicine" had sunk deeply through the pigmented surface into the plaster beneath, and the chemical reaction had locked the components together.

The man who made the miracle is an intense, balding, sixtyish chemistry professor from the University of Florence, Enzo Ferroni. Ferroni was a casual art lover whose ivory tower was demolished by the disaster of 1966. On impulse he telephoned to restoration authorities to offer "my modest knowledge and my great desire to be useful." He did it, Ferroni recalled later, "not as a scientist nor even as a Florentine, but as a citizen, because these things do not belong to us, or even to Italy. They belong to all the world of men . . . what had happened was terrifying."

At first Ferroni and the restorers and the volunteers dealt only with extreme emergencies. There was, for example, the instant growth of mold on the water-impregnated masterpieces. Men with rubber gloves, rubber boots and gas masks sprayed disinfectant over everything. Still the microorganisms grew. The restorers called in microbiologists, and asked them to find a mold-killing antibiotic. By good fortune, one existed on the commercial market, a product called Nystatin. It is a stomach medicine administered by pill. There is no way to give a wall or a painting a pill, but the product exists also in powder form and the scientists quickly devised a practical solubility and a spray-gun which could apply it to frescoes and paintings to halt mold formation.

Next most urgent was the problem of frescoes that had sucked up water until they could hold it no longer and were excreting it outward, threatening in the process to wash away the paint on the surface.

"This was like the problem of the Dutch and their dikes," Professor Ferroni recalls. "Something had to inhibit that flood, that outrush, and make the water retire behind the film of paint. The worst were the frescoes of Taddeo Gaddi in Santa Croce. We had instantly to find some liquid which we could spray on to make a dike, to hold back the waters. We began in the most pragmatic way, to build up an 'Identikit.' We needed a liquid which we could spray because the fresco was too fragile to touch with a brush. We needed a liquid insoluble in water—if it were soluble it would simply wash away. We needed something which would not evaporate rapidly, which would not mix with the paint, which would not change the color of the paint, which would not be toxic to the men who

Detail of restored right arm of the *Crucifix* shows how little of the original painted surface is left.

must apply it. Slowly, bit by bit, we built up our Identikit and then we found our product: tributylphosphate, known as TBP on the commercial market. It was perhaps our least scientific treatment, but it worked. We stood there and sprayed it on, over and over again, over and over still again, until the water seeped out of the fresco and did not wash away the paint. The Gaddis were saved."

As the hectic weeks passed and the most urgent cases were moved, first to the lemon shed of the Boboli gardens, the famous *Limonaia di Boboli,* and then to the Medici palazzo which Florentines call the Fortezza da Basso, to distinguish it from the high fortress on the hills above the city. Ferroni was struck by how much more there was to do, how many more fields in which possibly science could help. He had learned, in frantic days and nights, a lot about the chemical structure of paint, of the gesso which underlies many paintings, of the plaster of walls. He had become convinced that the only real restoration must, where possible, employ inorganic materials. In a fresco itself, as created, most of the materials are inorganic.

Ferroni felt that the inexorable, slow, process-of-elimination approach of scientific investigation could surely help. He remembered an x-ray diffraction apparatus which J. J. Trillat had built for Bellevue Hospital in New York City, and he thought it might be useful to analyze the fresco sickness and find a cure. He wrote Trillat, got permission to build a similar apparatus, and with the help of the Italian national research center in Rome he built one. By studying the curves of its chart (p. 34), he was able to analyze dozens of flakes of fresco, of plaster, of gypsum and subjected his samples to a series of chemical counterattacks until he finally found the appropriate cure.

Now Professor Ferroni is hopelessly hooked on art restoration. Always an early riser, he has for the past six years arrived at his university offices at 6 A.M. so he can finish his academic work and still have time to devote to his new passion. Both he and restoration director Baldini have acquired speech patterns which fall strangely on the ear: Ferroni talks like Agent 007 using words such as Identikit, tracers and evidence, and Baldini sounds like Dr. Kildare as he speaks of terminal cases of frescoes or paintings on wood which must actually be lifted and moved—the restorers' term is *trasporto*—in order to save them. He shakes his head sadly at the mere thought.

Trasporto is radical surgery, and it is used as rarely and as reluctantly as is radical surgery on human beings. When the painting is on wood, it involves turning the whole thing upside down and carving away the

wood, by fractions of millimeters, until the painting's "bed" is reached. In the case of the Cimabue this was considered not desirable. For one thing, the wooden cross itself was a work of art which should not be hacked away. Instead, the surviving paint was lifted flake by flake from its gesso bed, dried for months under an infrared lamp, and finally fastened to a light canvas backing—which was then put back on the wood.

Ferroni modestly insists, "I am not an expert in restoration. I have approached the art world very recently. What I have done is not even an idea, really, it is just deductive. These methods are not a stroke of imagination but the result of the most plodding, methodical work. To find a *better* method would be real research."

Baldini, equally modest, insists, "I am only the art historian who provides an equilibrium between the restorer himself, a traditional figure, and the scientist who opens the way for us to new tools. We must go ahead like a troika."

In this particular troika the third man, the restorer, is silver-haired Dino Dini, a veteran of the *Laboratorio del Restauro.* Dini and Ferroni spent hours, weeks, months—endless sessions—sitting on the rough wooden benches inside the chilly chapter house of the monastery of San Marco, surveying their ailing Fra Angelico, deciding what to do. Even after the cure was found by Ferroni's analysis and his x-ray diffractions, there were technical problems. One could not, for example, brush onto the Fra Angelico the magic chemical formula: The paint was too fragile to survive such treatment.

Dini came up with the answer. He could apply, he said, a sheet of Japanese rice paper, soft and porous, to the surface of the fresco to hold its precious paint particles, and he could impregnate a refined wood pulp with a solution of ammonium carbonate and, later, with barium hydrate, and then put the pulp onto the rice paper in a kind of bandage or compress, an *im-*

Above is a portion of the Sogliani fresco in the monastery of San Marco with outline of head before restoration. A gypsum deposit covers it. In the next picture, an *impacco*—or compress—of chemicals

pacco (see below). This system would prevent rapid evaporation of the chemical solutions, would eliminate the need to touch the fresco manually, and would insure an even, slow distribution of the corrective compounds onto and into the fresco and its base.

Dini's system worked. Only a tiny bit of fresco could be done at one time, and each section had to be examined and analyzed to determine the amount of *impacco* time needed. In Ferroni's labs five or ten minutes of reaction sufficed. On the Fra Angelico fresco the wood pulp compress had to remain for two to three hours; on the Sogliani, five hours. Dini and his assistants spent five years putting compresses on the enormous Fra Angelico.

Nowadays the chief fear of the Florentine troika is that their solutions to specific problems may be mindlessly applied to works on which they will not be efficacious. Each fresco, each painting, each sculpture is an entity of its own, subject to its own local conditions and victim of its own kind of degradation. What cures one may not work at all upon another.

"These are not kitchen recipes, to be used by anyone for anything," warns Ferroni. "What if some fresco were invaded by another formation—say, for instance, a sodium salt?" asks Dini. "Another cure would have to be found."

"Caution," counsels Baldini. "Always caution. Our patients are unique in the world, we must not make them sicker by rushing to some 'new,' 'modern' treatment that comes along."

All three, with their assistants, agree in a new concept of artistic preservation: They want to find a way, with heaven-knows what financial means and trained technicians, to intervene in the life of art works before the need is crucial. There should be a way, all agree, to practice preventive medicine upon the treasures of the Renaissance.

Today the vast, sprawling *Laboratorio del Restauro* is crammed to the rafters, as always, with crucifixes, paintings, frescoes, all standing in line for treatment at the hands of men and women in white jackets like those of interns (see p. 28). They walk up and down checking temperature and humidity gauges, or they bend for hours over paintings, peering through magnifying glasses and lifting lightly, with saturated cotton balls or tiny tweezers, the flakes of dirt and corruption from painted surfaces. They supervise enormous suction systems which coax damaged frescoes, panels or paintings back into their original shape with hot, cold, very humid or very dry air, as the case may require. They direct carpenters who fit and shape floating wooden supports for paintings on panels, to direct the expansion and contraction of the underlying wood so that it will not crack the precious paint.

They use physicians' words, but their voices are hushed as if they were in church, and their sacristy is a

has been applied. Then, after five hours, Professor Dino Dini carefully removes it. The treatment reverses the chemical reaction that caused the gypsum "veil" to form, with the result seen just above.

tiny coffee room at the end of a long corridor. Here they meet to smoke, to drink espresso, to talk over their mutual problems—and to check their eyes. The coffee room's only decor is an eye chart, and the eyes of the restorers stray to it semiconsciously with each cup of coffee. They stare, close one eye and then the other, and check themselves. In the profession they have chosen, their sight is as crucial as their sensitive hands.

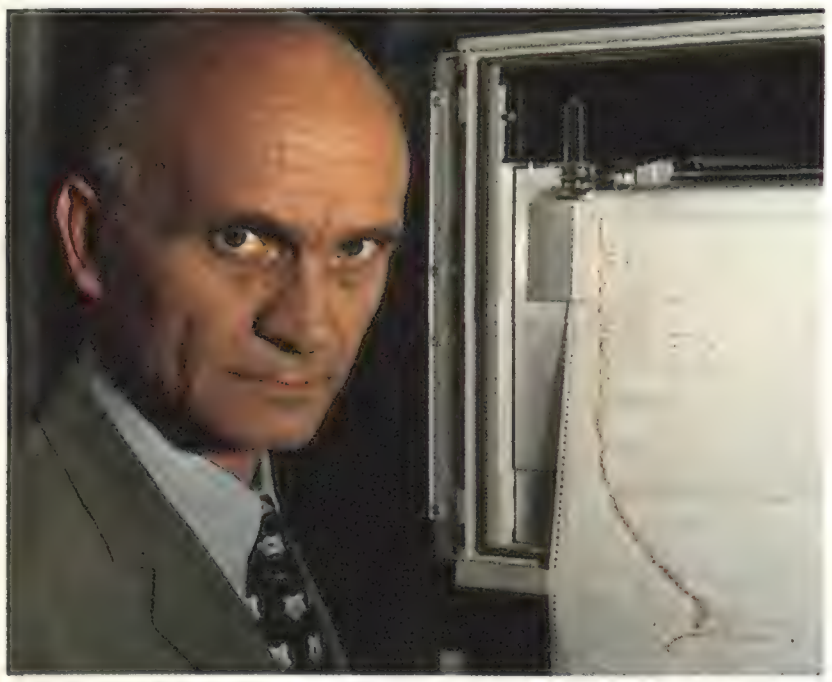
Their invocation, their incantation, their gospel, is the single word "restore." They deplore as heresy the alteration of an ancient work. Many of their problems were born of earlier, clumsier "restoration" which involved repainting, sealing, varnishing—some alteration of the original. They tell with horror of experimental varnishes which ruined paintings, of egg-based pigments which deteriorated within years when used to "restore" damaged works, of vellum volumes whose crinkled pages were encased in "restorative" plastic and which only crinkle worse but are now irrevocably sealed in a man-made product foreign to the original.

Ferroni's techniques and approaches demand a resort to materials present in the components of the original frescoes. They are almost universally inorganic and inert. Above all, today's Florentine restorers believe in the *reversibility* of their treatment. This means a treatment which changes the defect, but which is in and of itself changeable again should the cure prove faulty. Anything they do, from chemical application to cleaning to remounting, can be undone if necessary. No longer will they tolerate an irrevocable restoration. Retouching with permanent paint is out. Sealing is out. Even *trasporto,* once considered a triumph of the restorers' art, is out except as a last resort.

Such purity of concept and method is rare in human endeavor, and deserving of the utmost respect.

To prove that they are also human, the restorers of Florence are willing to compromise their lofty scruples, just a shade, to accommodate human beings and their illogical loves. If a much-adored statue or painting of absolutely no artistic value arrives, from some provincial church, to the *Laboratorio del Restauro,* and the people want it restored in the old-fashioned way, then the restorers will do it. They will, to make the parishioners happy, clean it, repaint it, give it back in all its gaudy inartistic but realistic color to the faithful.

"Such things are cult objects," says veteran restorer Vittorio Granchi. "If we must in effect make a copy and restore it to its place, we can do so. After all," he adds gently, "it is not surprising that some people don't like to pray to a fragment."



Professor Enzo Ferroni shows the curves on chart issuing from his x-ray diffraction detector.

Professor Dino Dini stands before Fra Angelico's *Crucifixion,* on which he worked five years.

Called the "Picasso Madonna," this is a restorers' joke: a painting of no importance from which various layers have been peeled to show that the 13th-century original was twice overpainted.

From generations of immigrant languages and
the countless events that they described

comes our American speech, chock-full of vigor
despite what Professor 'Enry 'Iggins said.

By Mary Ellen Dohan

A lallapalooza language's roots are worldwide

Only in America could a bummer dunk
his sinker in the blue John and find it more
Confederate than an all-fired Irish hoist

When the story of our times is told, the teller of the tale will use words that until recently did not exist—*astronaut* and *laser, urbanologist* and *sexism, psychedelic* and *smog*. The vocabulary of each generation reflects its historical climate, and—unconsciously created—reveals as no mere history can the spirit of a time.

We use today words whose roots we share with Iranian and Welshman, Greek and Slav, because long millennia ago our ancestors traveled together. We use words bequeathed to us by brave and often illiterate pioneers who found a world new to Englishmen and named the things within it. We use words that came to our shores as a result of distant events—a potato famine in Ireland, revolution in Germany, pogroms in Russia. And we use words that we ourselves have made because the language had no words for what we wished to say—and thereby leave *our* record for posterity.

For two generations after the founding of the Republic, immigration from abroad was not an important factor in the development of either the nation or its language. Then suddenly, in seven years—just seven!—there arrived in the United States almost three million people, the first of the great waves that would bring within the next two generations an astounding total of some 30 million people from across the sea. Such a migration had to affect the language.

By 1860, the Irish constituted the largest body of foreign-born residents in the land: 1,611,304. Close on their heels came the Germans: 1,276,075. Since Colonial times Germans had settled in America and should have had marked effect on American English. Surprisingly, they had not. Unlike the easily assimilated Welsh and Scotch-Irish, the Germans in heavily German areas had continued to use their own speech and contributed little save regional terms.

Nineteenth-century Americans labeled the now spreading German speech and accent both obtrusive and laughable. *Hans Breitmann's Ballads,* by Charles G. Leland, supposedly presented the speech ("I schpeaksch English") of the typical German immigrant, who was caricatured in *Harper's Magazine* in 1861 wearing a beer barrel for a coat, smoking a porcelain pipe with a long stem and carrying a long sausage and a sheet of music under his arm. Parodies like "Mudder, may I a schwimming went? Nix, my grosse dotter!" were thought hilarious.

A great number of German loan-words in more mundane areas entered the American vocabulary and, despite their late start, their number is exceeded only by those from Spanish. *Bummer,* which gave rise to *bum,* verb, noun and adjective, plus *bumming* and *bummerish* and *bummy,* is apparently from German *bummler,* an agent noun from *bummeln,* to waste time. That the term was surely associated with Germans in the minds of Americans of the 19th century is evident in a quotation from the Portland *Oregonian* of January 27, 1855: "Come, clear out, you trunken loafer! Ve don't vant no *bummers* here!" Of course William Tecumseh Sherman's foragers fixed the word in the language.

Of undisputed German origin are the many words for food and drink with their related terms which evoke an image of the beer-barreled, sausage-toting German: *pumpernickel, dunking, lager, pretzel* and *stein.* Late in the century other terms came into the language, *frankfurter* and *wienerwurst,* the latter quickly becoming *wiener* or *weenie,* and *Hamburg steak,* destined for a great future. Changed to *hamburger* at the turn of the century, the word eventually contributed to the language that suffix-of-all-work *-burger.* The contribution has made possible not only *cheeseburger* and *chickenburger* but even *Mexiburger,* an unlikely etymological mating indeed.

The southern Irish brought to America, along with little wealth and less education, the old Jacobean pronunciation which had become provincial in America. They said *tay* for *tea* and *jine* for *join* and *sass* for *sauce, ag'in* for *again,* and *chaw* for *chew,* just as the most elegant English had been doing a century earlier and as Americans on the frontier were doing still. They gave new vigor to the old forms, and most of us

A former English instructor, Miss Dohan has won short story awards writing for educational and women's magazines. Our Own Words *is her first book.*

Drawings by Emily A. Eiselman

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today are much more likely to get *riled up* than *roiled.*

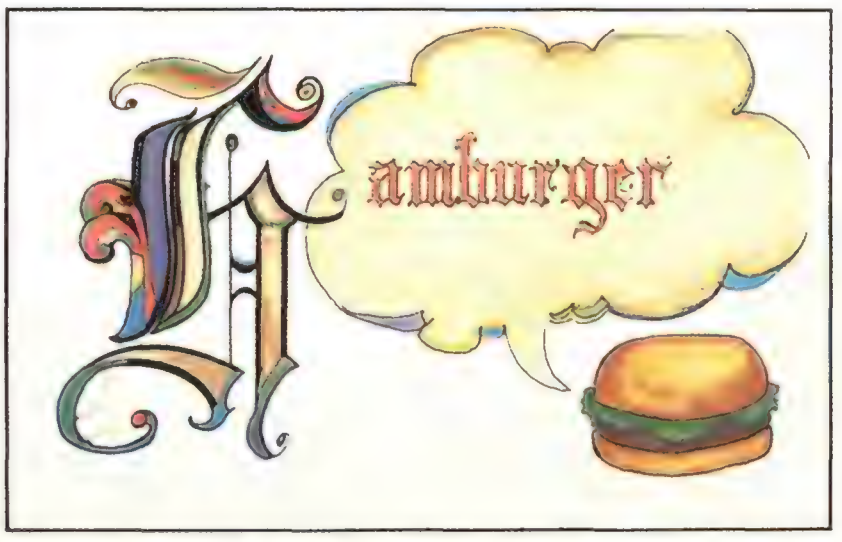
Paddy (for Patrick) was disliked as soon as he began coming in numbers. Poor, Catholic, aggressive, noticeable and noisy, he aroused an antagonism which brought into full flower and into the vocabulary the latent nativism of long-settled Americans. Political parties opposing further immigration and the franchising of the foreign-born were organized. The attitude of most Americans, however, was more contemptuous than hostile, and as the immigrants became ditch diggers or domestic help in an increasingly affluent society, social scorn found expression in derisive terms. *Paddies* or *micks* (from *Michael*), and *biddies* (from *Bridget*, for the women) found themselves facing the caveat "No Irish Need Apply" on houses to let and on office doors. A shovel or spade was called an *Irish spoon,* a wheelbarrow an *Irish buggy,* defined in a stock witticism as an invention that had taught Irishmen to walk on their hind legs. Their reputation for contentiousness had crossed the sea with them; to *Irish beauty,* listed in *Grose's Classical Dictionary of the Vulgar Tongue* as a woman with two black eyes, Americans added *Irish confetti,* bricks, and *Irish hoist,* for a kick in the rear. *Irish,* to indicate anger in the phrase *getting one's Irish up,* was in the vocabulary as early as 1809.

A few loan-words, probably Irish, did enter the vocabulary: *Shebang,* related to Irish *shebeen,* an illegally operated drinking place; *shenanigan,* with its fine Irish flavor, may indeed be from Irish *sionnachuighim,* "I play tricks." *Lallapalooza,* while not Gaelic or even English, is a Mayo county provincialism for a sturdy fellow, and comes, according to P. W. Joyce, from French *allez-fusil,* which means "Forward the muskets!"—a memory of the French landing at Killala in 1798. Some words like *shillelagh* or expressions like *begorrah* are widely known but rarely used by non-Irish save in jokes about Pat and Mike, now outmoded in our sensitive, humorless and anti-ethnic modern age.

By the time of the Civil War the vernacular had achieved respectability in speech as it almost had in literature, reflecting along with the writings of Lowell, Whitman, Bret Harte and Mark Twain—just beginning—the multifaceted, vigorous, turbulent life of the period. And across the addresses, letters and daily speech of that most American of men, Abraham Lincoln, there streamed "the new words of the American language," their author caring not "a cornhusk for the literary critics."

During and particularly after the war years, baseball terms proliferated; industry-related terms were brought into the vocabulary quickly because of need created by the war. New railroad terms increased the railroad lexicon; in 1865, *commuters' roads,* "running chiefly for the accommodation of city business-men with suburban residences," were established. The discovery of the *Comstock Lode* in Nevada in 1859 had drawn men to the *Silver Land; bonanza,* from the Spanish, which had meant the accidental discovery of a rich vein of ore, came to be applied to the vein itself. In the agricultural field, farmers bought the new *headers,* reaping machines which cut the heads off standing grain; *combines,* which headed, threshed and cleaned the grain, too; *hay rigs; hay loaders.* On the urban scene, *brownstone front* became a familiar synecdoche for the mansions of the wealthy, where *parlor girls,* probably Irish, "did" the silver and china and *hired girls* and *house help* labored over the new *wash benches,* manufactured along with ironing tables.

The West retained its supremacy as the fountainhead of neologism for only about a quarter of a century after the Civil War; but during that period the call of land and of gold and silver was still strong. From all sections of the country, men came to blend



Germans brought "Hamburg steak" which sired the "burger" suffix, including even "Mexiburger."

"Electrician" once described a student of a mystical "electric fluid" which you could feel, not see.

their various accents into a rich mélange and to be challenged to linguistic invention.

In August 1869, the *Overland Monthly* published a study of "South-Western Slang" by "Socrates Hyacinth." According to Hyacinth, Texas itself was "a bundle of crooked and stupendous phrases, tied together with a thong of rawhide," his metaphor for a land where "rabbits have somehow gotten the body of the hare and the ears of the ass; the frogs, the body of the toad, the horns of the stag-beetle, and the tail of the lizard; the trees fall up-hill, and the lightning comes out of the ground." There, towns were named *Lick Skillet* and *Buck Snort, Hog Eye* and *Possum Trot;* revolvers, *Meat in the Pot* and *Mr. Speaker;* oxen, *Presbyterian* and *Filibuster.* But aside from these extravagances there were utilitarian words and phrases too; and they tell something of the aftermath of the Civil War and the nature of the land. Texas sentiment as well as that of the soldiers moving westward was reflected in the term *Confederate* to express strong approval, as in "You're mighty Confederate!" *Slow bear* and *mud-lark,* euphemisms for the hogs clandestinely smuggled into camp, were still in use.

The Southerners had brought some of their regional expressions into Texas: *cush,* for corn meal fried in grease, the Arabic-African-Gullah term, was evidently new to Socrates; so were *blue John,* for skim milk; *collards* (probably adopted from *colewort*); *kettlings,* evidently a variant of *chitterlings* or *chitlins;* and *puddings,* a kind of pork sausage. Terms peculiar to Texas were *jimpsecute* for a sweetheart (female); *juicy-spicy* for her beau; and *scads* or *oodles* for much or many, or, in combination, *scadoodles.* Occupational terms relating to cattle-breeding were numerous: *muley cow,* for a cow without horns; *pointers and siders,* for herders on a cattle drive; *on herd,* for on and off duty; *cutting out; cow-whip; ox-whip* (which differed from cow-whip in the length of the stock); *maverick. Mustang* occurred in frequent combinations. Mustangs could be *religious* (well-behaved) or *buckers;* most of them, in the opinion of cattle men, were not *worth shucks* and were likely to run *skygodlin* (obliquely) or to go *scallyhootin* and stop *suddent.*

Other words and phrases expressive of Western life were still pouring into the language. Gradually the terms made their way East; and Easterners adopted them timorously, a little abashed. In *Harper's Magazine* for October 1886 we read: "It hasn't—ah—'panned out.' He [the speaker] involuntarily made a droll face as he uttered the Westernism."

This growing fragmentation of vocabulary content among special groups was symptomatic of an increasing fragmentation within society. Thomas Jefferson and the humblest Virginian (or New Englander) could have discussed farming; men were linked by the land and the language relating to it. Now, as the first shadows of technological specialization appeared, communication faltered. What, for instance, did an *electrician* do? The word had meant earlier, according to Webster in 1806, "one versed in electricity," a man who, like Franklin, studied and experimented with *electric fluid,* that dangerous substance which concerned the average man only when it traveled menacingly from the sky; now an *electrician* made or *fixed* (repaired) anything powered by that mysterious element which was not a fluid after all and which preachers were using as an analogy for God—you couldn't see it, but its effects told you it was there.

In 1899 *Notes and Queries,* on May 11, appealed to its readers: "A New Word Wanted.—Correspondents of America Notes and Queries are requested to send suggestions for a word that shall express execution by electricity." The appeal was accepted as a linguistic

Irish for "stout fellow," this may have come from the French command *allez-fusil.*

challenge. The *North American Review,* plunging with zest into the etymological pool, suggested *electrolethe* (Greek—*electro-lethe,* forgetfulness). The *Saginaw Evening News* introduced *electricide.*

In the *Congressional Record,* reference was made to electrical execution as the *Kemmler process,* dubiously honoring not its inventor but the first criminal to experience its final solution. And—most disturbing—the *Chautauquan,* journal of that organization which appealed to the middle-class, middle-American, middle-education citizen who spoke good honest vernacular without conscious ornament, made a downright subversive suggestion: "A Latin word for execute, to go with electric, or a Greek word to go with electro is wanted. The Latin word execute makes electri-execute, which would contract into electricute." *Electrocute,* a hybrid of Greek *electro-* plus Latin *-cute,* eventually won out; but the people had the last word. Before long, criminals were simply *sent to the chair,* and everyone got the picture.

"Typewriter" joined the "cash register" and "adding machine" in revolutionizing business.

In a final fillip at all the formalism having to do with electricity and related mystifying elements, *electrified* came to be used for moderately drunk.

This deliberate search for etymological roots suggests the entrance of a new element in American word-making. The exuberant, adolescent spontaneity which had dominated the language and the American spirit for half a century and more was being challenged by a more urbane, self-conscious urge toward correctness. Darwinism had shaken frontier fundamentalism and with it some of the breezy self-confidence reflected in the frontier vocabulary. The American idiom, nevertheless, had gained too much strength during its growing-up years to be intimidated. Henry James was writing, but so was Mark Twain—and the latter's introduction of words and phrases relating to nearly every area of American life and made in the American way—compounds like *stockholder* and *typesetter* and *hayride;* parts of speech combinations like *gilt-edged* and *dead broke* and *all-fired;* verbs and adjectives made into nouns such as *stake* and *jockey* and *husky*; expressions such as, *take it easy, close call, eat crow, get even* —gave reassurance that the American vernacular had lost none of its vigor. Before the turn of the century, the language had absorbed an array of colorful coinage including *smarty; uplifter; rubberneck; knicker; ad* (from *advertisement,* fought vigorously into the 1930s by advertising men who considered the form "beneath the dignity of men of the advertising profession"); *flyer* (financial); *sleeper,* both for a sleeping-car on a railroad and, figuratively, for something unnoticed which suddenly attains value; *night-owl; shanty-town; sandlotter; sinker* (doughnut); *spellbinder; bonehead; sissy; dude;* and countless other words in the vernacular tradition. Expressions like *to pass the buck, chip in, square away, keep one's eyes peeled, know-it-all, neck-and-neck,* and *like fury* were in common use.

As the *cash register,* the *adding machine* and other inventions joined the *typewriter* in transforming business methods, the *bachelor girls—typewriter girls* and *telephone girls (hello girls,* Mark Twain called them) and *salesgirls*—rode the new electric *trolleys* towards the business offices of America, changing as drastically as the new skyscrapers the American scene.

The center of population was moving steadily westward—by 1900 it was in Indiana—and the "average" American spoke with a Midwestern twang, of which he was proud. *Theatre parties* were made up to attend the performances of John Drew, Richard Mansfield, Minnie Maddern Fiske. Sarah Bernhardt and Sir Harry Lauder were making their numerous "farewell" appearances; Maude Adams played *Peter Pan.* Madame Schumann-Heink sang, as did Nellie Melba; Paderewski played. There was the new *light opera.*

On a less elevated level, *minstrelsy* was still popular; and the *Tommers,* who played only *Uncle Tom's Cabin,* appeared everywhere.

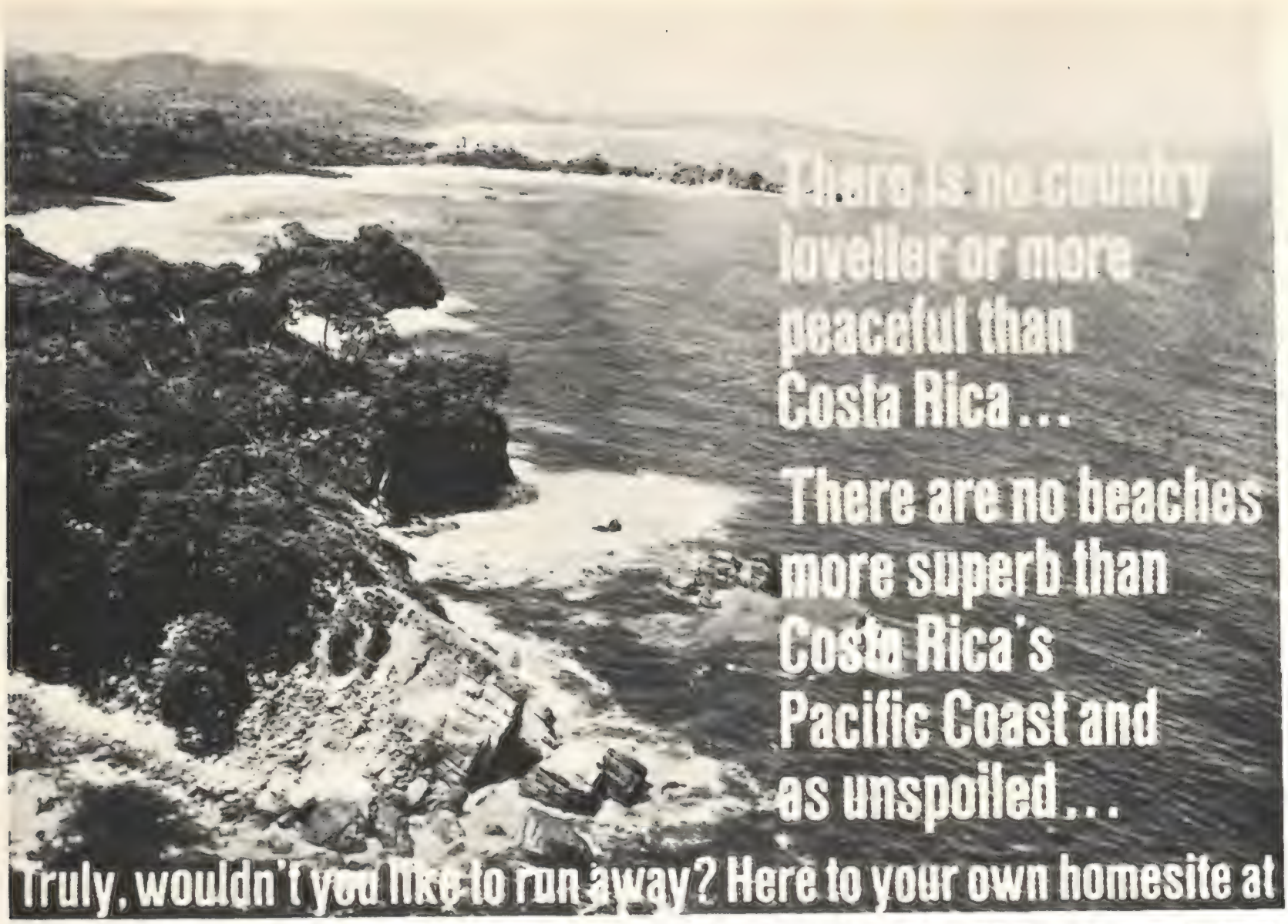
On *music stands* in the parks, bands played Sousa's new marches, and on summer evenings, boys and girls gathered at the *ice-cream parlor* for an *ice-cream soda,* while their parents might be sipping the popular new *iced tea* at home. Groups gathered in the parlors around *pianolas,* while others, more daring, went to the *concert saloons* (night clubs) where the bands played *ragtime* and everyone knew the *cake walk,* that imitation of the "darkey strut" or "walk-around" which traditionally earned a cake for the fanciest step.

Those who spent time reading were discovering the familiar and comfortable scenes and vernacular of such as "Mr. Dooley," that early Will Rogers created by Finley Peter Dunne. American authors coined distinctively American words and phrases, George Ade's *glad hand* and *tightwad,* Jack Conway's *pushover* and *high-hat.* A new kind of entertainment was being talked about, too, but had not yet caught on; Mr. Edison had invented what he called the *kinetoscope* and some called the *biograph.* The device showed pictures of objects actually in motion; the average simplistic American thought *moving pictures* a better name, would soon reduce it to *movie.*

The contemporary vocabulary—forceful, picturesque, colloquial, often playful, retaining the innovative, unconventional quality which had come to distinguish it from British English—reflected the personality of its makers. When President McKinley said that he would not be *jingoed* into war, adding a new verb to the language, the average American would have been shocked to know that the word was a euphemism for *Jesus* and came from "by jingo!" in the refrain of an English fighting song; but the word had a good American sound, by jingo!

Theodore Roosevelt's response that the President had "no more backbone than a chocolate éclair" delighted him too. *Backbone* was true-blue American; politicians had been using it for years, attacking for lack of it, among others, President Lincoln and General McClellan. *Chocolate éclair,* familiar enough to show with what ease foreign terms were now slipping into the vocabulary, was not only a perfect image of the backboneless but la-di-da foreign besides.

When in 1892 an author used typically American imagery in relating a Harvard anecdote: "I was on the box-seat driving, you know—lickety-split, to beat the band," it was clear that the last bastion of purism had been breached. American idiom was on the box-seat driving, lickety-split, to beat the band.



BEACHES of NOSARA

Truly, wouldn't you like to run away here to this garden of ours? Doesn't your bruised spirit need the soft touch of loving people, your tense body the pure spray of clean, *clean* air filtered by sunshine? Don't you long for a place where every day is gentle summer, where tree-wrapped mountains in the background stretch 12,500 feet to the sky, where tumbling streams and waterfalls and wave-lapped beaches beg to heal you?

In all truth, isn't it a sort of self-destruction to accept without demur (as maybe you do) the dank cheerless clutch of winter cold—further aggravated by a fuel shortage?

So we ask you again: wouldn't *you* like to run away here to a place of your own in this nature-blessed country, inhabited by a people who deserve every bit of the beauty they've been given?

For the astonishing fact is that the Costa Rican people—perhaps like none other on earth—live in peace. All of them, each with the other, live and work in *PEACE!*

Consider them, the 1¾ million of them: handsome, gentle, literate, industrious and (phenomenon of our times!) kindly—a European-sprung people who are constantly embracing, shaking hands, even with strangers, a people to whom law and order is symbolized by a smiling policeman armed with nothing more menacing than a whistle, directing traffic with a murmured *"por favor."* The phrase "law and order" doesn't have an ominous meaning here. It's incredible for a foreigner to learn that there is no army in Costa Rica (without an army, Costa Ricans say, there is no danger of a military take-over). The only military uniforms worn are by police and there are more schools in Costa Rica than there are uniforms. Not alone more *school-children* or more *school-teachers* but actually more *schools* than military uniforms! Amazing? No wonder that Gov. Nelson Rockefeller, having undergone a rather stormy Latin American tour in 1968, exclaimed happily when he finally got to *simpatico* Costa Rica: "This perfect jewel of a country!" *The NEW YORK TIMES* in an editorial on February 5th, 1970 headed *"Costa Rica's Example"* praises the solid democracy of this tiny country and says in part: *"Doing what comes naturally, a half-million voters have brought off (Costa Rica's fifth successive) peaceful presidential election in twenty years."* Yet, it isn't only each other whom Costa Ricans like. There is no xenophobia here at all: foreigners are warmly welcomed and North Americans, especially, are cherished. Nearly 15,000 of us from the U.S. live and prosper in Costa Rica. English is widely spoken, and the word has been gradually slipping out that in this *"jewel of a country"* lies the fulfillment of the wistful dream of so many harassed Americans: the mind picture of that perfect retreat where climate and man are in gentle harmony with each other.

It's rather astonishing that this spectacularly beautiful country, really not that distant from the States, is much less familiar to Americans than the islands of the Caribbean. Almost everyone knows, and many have visited, the grouping of tropical Edens called the West Indies—their fabled greenness, the sparkling waters in which they are set. Yet Costa Rica's climate has all the balm of its island neighbors and is more exhilaratingly varied. The sea that stretches along the east coast of this slender strip of Central America *is* the Caribbean. Go west less than 150 miles and there is the Pacific: nowhere does this greatest of oceans wash more beautiful shores than Costa Rica's. Incongruously, some travel writers have called this country "The Switzerland of Central America"; still it is true that Costa Rica's mountains are as glorious in their tropical setting as the Alps in *their* ambience. And it is further a fact that these mountains aid in making the climate the delight it is. San Jose, the capital, is in the central plateau, 3500 feet above sea level, and about midway between the Caribbean and the Pacific. The city's climate is simply nothing less than perpetual Spring with the mean temperature steady at 70° every month of the year. But even at Pacific coast, sea level—at our BEACHES OF NOSARA, for example—even here, the mean annual temperature is only 78 degrees accompanied by humidity so low that it can't be matched by the Caribbean islands. And not to put down the exotic West Indies, there's a good deal more of Costa Rica that the islands can't match. Nature thrives on an immense scale here. Naturalists have identified 762 species of birds (in *all* of the United States, 130 times Costa Rica's size, there are 725 varieties). And such birds! Partridge, parrots, cuckoos, toucans along with the wrens, thrushes, orioles, finches. We have deer, raccoon, monkeys. Costa Rica's soil is so fertile that Texas cattle

ranchers are incredulous that what would be prized crop acreage in their state is used casually as cattle-raising land here. And what lush growth springs from the soil! Great forests of majestic trees; lignum vitae can be so huge that a single tree's branches may shelter an entire herd of cattle. There are groves whose boughs bend under the weight of fruit—citrus, mangoes, bananas, coconuts. Costa Rican coffee is unparalleled. Hundreds of varieties of orchids grow wild. We produce vegetables of a size and flavor such as few North American housewives have seen.

Costa Rica has a record of steady economic progress and every foreigner who has come here is instantly aware that this progress is mounting toward affluence. Clearly, a country of such natural richness and with so extraordinary a people, puts fresh meaning into the overworked word *opportunity*. Oh, opportunity is here, all right. And for none better than for North Americans. There are no restrictions against private investment and the list of American businesses, small and large, is long. For you who simply want to retire, there are special privileges if you are not a Costa Rican. All you have to prove is a guaranteed income of $325 monthly for you and your wife and you are exempt from paying taxes. San Jose 100 airmiles away has everything—for soul as well as the stomach. Opera, symphony, splendid movie houses, theater (its National Theater, marbled and mirrored, is a graceful replica of L'Opera in Paris). Many doctors and surgeons are from U.S. medical schools; the hospitals are excellent. You can buy anything in the handsome shops and the cost of living is joyfully low. T-bone steak, eggs, vegetables, fruits are far below U.S. prices.

Education is a positive obsession in Costa Rica. There are 2,379 elementary schools with 350,000 children attending, and 112 high school, art academies, business schools, etc. The beautiful complex of the University of Costa Rica has an enrollment of 12,000 students. And the academic standing of the English language private schools is very high. The most prestigious of these accommodates North American children at a tuition of $38 a month. And that includes busing to and from school!

San Jose has a fine airport, one of the largest, most convenient and modern in Central America, and the jet flight from Miami via LACSA is 1,123 airmiles and by schedule takes about 2½ hours and presently costs $200 round trip. For the autoist the drive from the States along the Pan American Highway is a memorable one; south of Cartago in Costa Rica, the famous road climbs to its highest elevation—10,931 feet.

So it had to happen: Here we were, a group of Americans—land developers. We'd heard of Costa Rica and we came here, instantly to be entranced by its beauty and won by its people. We knew quite soon—almost like the original Spanish discoverers who gave it the name *"rich coast"*—that this was the country we'd been looking for. All that remained now was to find the quintessential tract of land that had everything—natural loveliness, serenity, climate, beaches. We found it. We found it in the peninsula of Nicoya directly on the Pacific. And we named this tranquil place . . . BEACHES OF NOSARA . . .

We've employed many superlatives in this ad—maybe, you'll suspect, even extravagances. Yet at the risk of once more stretching your bounds of credibility, we say this: that nowhere in the world will you find more glorious beaches than the two miles of beautiful white sand and unimaginably clean, clear sea that front our property. There is one section that is modestly compared to the best surfing Hawaii has to offer; and, wonderfully for the less adventurous, there is a long piece where the sea is quiet and where even infants can play in the water as it rolls gently onto the sand. If you're a shell collector you'll find, day after day, specimens you've never before seen. And out from shore are the boating and the skin diving, the fishing. A world of fish, a treasure-house for you, if that's your passion: tuna, dolphin, wahoo, grouper, snapper—the whole catalog, believe it. How rare to discover that today—a pure sea teeming with healthy fish. Yes, as much as anything it was the ocean and the beaches that caused us to choose NOSARA.

But then one turns his back on the Pacific and looks out at the land and isn't that something to see—this rich-soiled, lushly-covered sculpture of hills and valleys! It is big—3300 acres—but we intend to convert only a *part* of it to homesites. We've brought in ecologists and other scientists to help us preserve the natural beauty of this place. We have laid about 35 miles of horseriding trails, all within the boundaries of our property. If a precious tree stands in the way of a bulldozer the tree stays; we bend the road around it. If it's to be a match-up between "progress" and nature we'll ride with the trees and the birds.

But of course we've brought in the machines and used them. Every site in BEACHES OF NOSARA fronts a road. Every homesite is guaranteed electricity and pure water. Two tennis courts are ready for play. We expect our superb golf course with 9 holes to be completed in 1974. We've built a charming motel with club facilities and an airfield to bring you here quickly from San Jose.

We're not new to this profession. We've been developers in the West Indies and we do appreciate those magical islands. But this is the simple truth: no island in the Caribbean can claim what we have in this ad. And when one realizes that some improved sites in the West Indies have now soared to fantastic prices—$12,000 and up for a quarter-acre is now becoming the rule, then BEACHES OF NOSARA becomes almost too good to be true. For the price of our homesites range from $4,500 for a quarter-acre to $24,000 for two acres, 4% down and 2% a month, with no interest charges! And that *includes* roads, electricity, water, one year free golf membership and the unlimited use of the natural paradise that we've inherited and are preserving for you. An even greater bargain are the ranch sites in the PALMS OF NOSARA, priced as low as $5,200 to $11,000. These are less than 6 cents per square foot for ranch sites from 2 acres to 6 acres. The ranch sites have magnificent views of the Valley of Nosara and the surrounding mountains, plus use of all the recreational facilities at the BEACHES OF NOSARA. Ranch site owners in the PALMS OF NOSARA section have the option, at their own expense, of installing individual wells and generating plants or of building connections to the community water and electrical system located in BEACHES OF NOSARA.

We're running out of space and there's so much more to tell you. Some of you may visit us after reading this message. Most cannot. For those we have prepared a thick portfolio. It includes a large color brochure, maps, house plans, and a 96-page condensation of Prof. Donald Lundberg's authoritative book *"COSTA RICA."* All this is FREE.

Our portfolio also tells you how to go about reserving a homesite in BEACHES OF NOSARA and spells out our money-back guarantees: an unconditional 60-day deposit refund warranty; and a full year after signing contract to visit the property and see for yourself whether it delights you. If not, every penny you'd have paid in is refunded without a word.

We're quite certain that we have something very special in BEACHES OF NOSARA and we already know that the response to our advertising is going to be quite lively. We sincerely urge you—if you wish to be in time for the choice lots—to fill out and mail the coupon right away. Our portfolio is free and you are under no obligation at all. Indeed, no one will ever phone you or call on you. It's only the mailman you'll see.

BEACHES OF NOSARA Dept. M-9
1201 Broadway, New York, N.Y. 10001

Please send me without obligation your complete portfolio including color brochure, maps, and Prof. Lundberg's book *"COSTA RICA."*

Name .....

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City ..... State ..... Zip ....

Obtain HUD property report from developer and read it before signing anything. HUD neither approves the merits of the offering nor the value of the property as an investment, if any.

"A verified statement & offering statement has been filed with the Dept. of State of the State of N.Y. The filing does not constitute approval of the sale or lease or offer for sale or lease by the Dept. of State of any officer thereof or that the Dept. of State has in any way passed upon the merits of such offering. A copy of the offering statement is available, upon request, from the subdivider." NYA 73-1556

By Samuel Eliot Morison and Mauricio Obregón

Following Magellan's wake in his Strait

The world's greatest voyage of discovery encircled the globe in 1520. The two authors have retraced much of the route

On Tuesday the 9th of September 1522 the citizens of Seville beheld a strange and touching ceremony. The day before, the ship *Victoria*, Captain Juan Sebastián Elcano, had returned to this, her home port, after a voyage around the world taking more than three years. She was the first ship ever to circumnavigate the globe, only survivor of the gallant fleet of five with which Ferdinand Magellan had begun this marvelous voyage on August 10, 1519.

Now Magellan was dead, more than 100 men of the 265 men who left Spain were dead, too, and others were in captivity, so Captain Elcano and 17 sailors of *Victoria* were the only ones to complete the voyage as planned. Many times they had vowed to do penance if they ever returned to Seville, and now here they were, the chosen ones, emaciated, barefoot and in rags, exhausted from continuous pumping to keep their ship afloat. Each carried a big lighted candle to the waterside shrine of Santa María de la Vitoria, at whose feet Magellan had received the Royal Standard three years earlier before he sailed.

Nearly four and a half centuries later, we stopped in Seville. We had used an "aerial history" technique to follow the voyages of the Vikings, Cabot and Cartier, with the help of James F. Nields, Massachusetts industrialist and flyer. Obregón also used the technique in the Mediterranean to reconstruct the voyage of Odysseus. Now we were following the greatest voyage of all, the first circumnavigation of the globe.

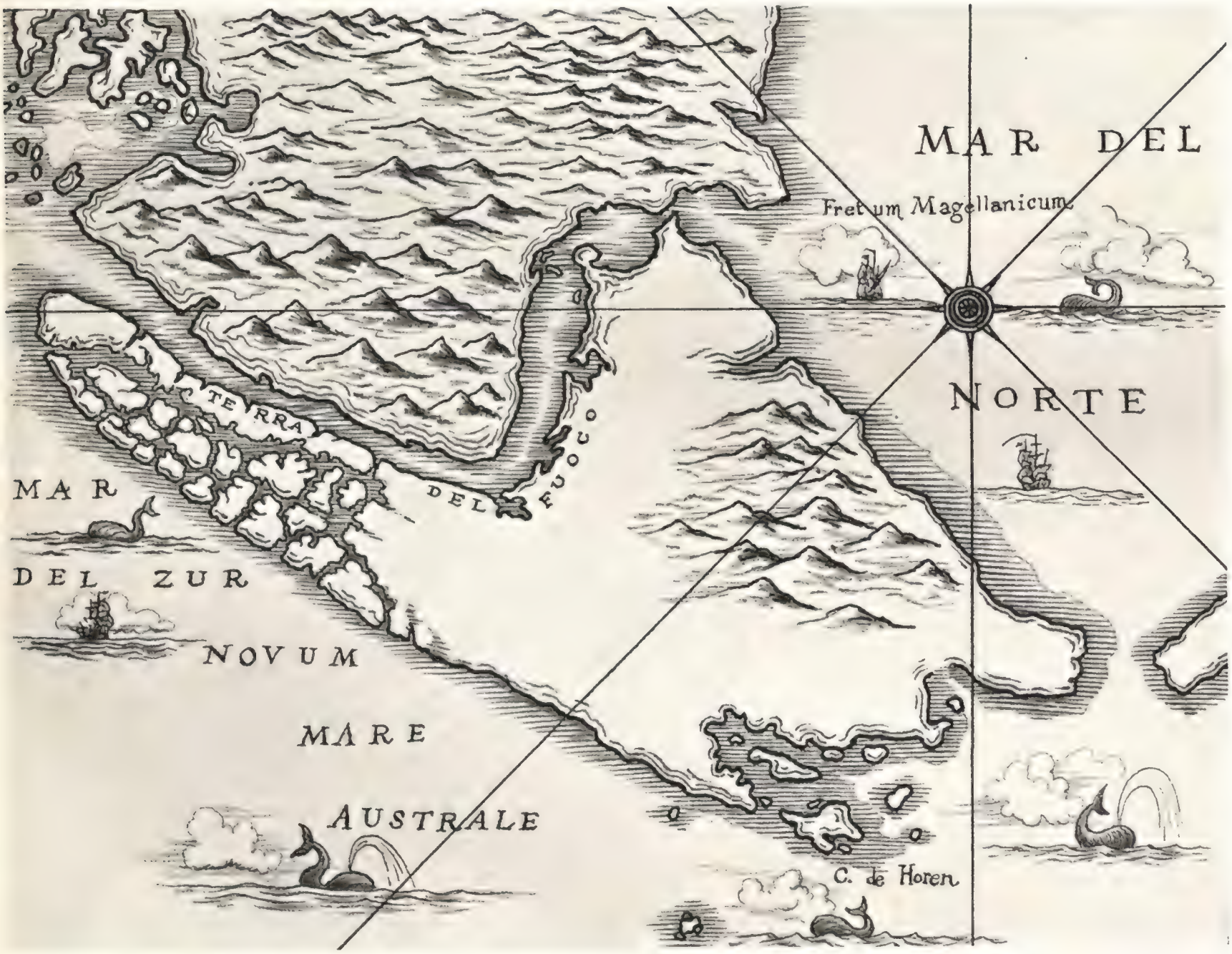
In Seville, the chapel where Elcano's men worshiped after their voyage has long since disappeared, but the ancient statue of Our Lady of Victory, holding her chubby, red-cheeked Son, we found in another church, the 13th-century Santa Ana. Before this church is a little cobblestone square bordered by low white stone houses, windowsills garnished with potted plants and caged canary birds. On a sunny January afternoon, as we emerged from paying our respects to Santa María de la Vitoria, small boys were riding bicycles around the square, little girls were dancing, and almost every window framed a man or woman looking at us. An aged white-haired woman on a balcony flung out this typical Andalusian challenge to us: "Photograph me; I am old but also very beautiful!" Although we have followed *Victoria's* entire voyage, this little scene in a square barely changed in four and a half centuries will always be fixed in our memories as the kind of setting from which the brave Spanish, Portuguese and Geno-

Ferdinand Magellan, a Portuguese, got backing from Spain for his voyage toward the Spice Islands.

The latest book by Admiral Morison (opposite), The European Discovery of America: The Northern Voyages, *was excerpted in* Smithsonian, *April 1971. This is from* The Southern Voyages, *soon to be published. Obregón, Colombian writer-flyer, joined Morison in* The Caribbean as Columbus Saw it.

This aerial photograph of the Strait's eastern mouth was taken at about the height of Magellan's crow's nest. This is how his lookout would have seen Cape Virgins after entering passage.

On this ancient map, oddly multilingual, Cape Virgins is the point forming the upper lip of Strait's eastern mouth (see photograph above).



ese sailors set forth, and to which so few had returned.

The greatest voyage of discovery in all history started as Magellan's dream. A Portuguese of noble ancestry, he went to sea at an early age, rose to be captain, and sailed east from Malaya as far as Ambon, but not quite far enough to reach the larger Spice Islands. His idea was simple: to find a strait through America which would open a short route to the Spice Islands, sailing west from Europe instead of east. Charles I of Spain—soon to be crowned Emperor Charles V—accepted the plan, and in 1518 appointed Magellan Captain General of a fleet to carry it out.

There were five ships: *Trinidad* (flagship), *San Antonio, Concepción, Santiago,* and *Victoria* of less than 100 tons' burden. The personnel, numbering about 265, was international: the majority Spaniards, about 40 Portuguese, a dozen or more Genoese, and a scattering of Greeks, Germans, Flemings, French, four or five blacks, one Englishman and two Irishmen. Fortunately for posterity, Magellan also took as passenger Antonio Pigafetta, a chatty Italian from Vicenza whose anecdote-filled narrative of the voyage is classic.

Before Magellan left Seville, his original partner, Rui Faleiro, had shown increasing signs of madness, so the Emperor replaced him with a courtier, Juan de Cartagena, whom he named captain of *San Antonio* and *conjunta persona* (person jointly responsible) with Magellan. Cartagena interpreted this to mean that he was joint commander with Magellan, who refused to accept an inexperienced courtier as such. So when Cartagena questioned his right to change course to the south, Magellan curtly answered that his captains should not worry about such things, but simply follow his flag by day and his lights by night.

Cartagena's challenge

Now the fleet ran first into a terrible storm, complete with St. Elmo's fire at the mastheads, and then into a prolonged calm. Cartagena took this opportunity to challenge Magellan again by hailing him simply as "Captain" instead of "Captain General," and when Magellan summoned his captains on board for consultation, Cartagena again tried to show his independence, even calling on the other captains to support him against the Captain General. Magellan put him in charge of the fleet treasurer, Luis de Mendoza.

Having crossed the South Atlantic to Cape St. Augustine on the Brazilian "bulge," the fleet in December 1519 sailed down the coast and into Rio de Janeiro Bay. For two luminous weeks the men dallied with the local Indians who happily sold the services of their sisters for a cheap knife.

Taking advantage of the general good humor, Magellan gave Alvaro de Mezquita, his nephew, command of *San Antonio,* and transferred prisoner Cartagena to the charge of the fourth royal appointee, Gaspar de Quesada. The vacation over, he sailed south as far as the Río de la Plata which, explored by little *Santiago,* turned out to be no strait but the mouth of two great rivers and 20 leagues wide. It was bounded on the north by a cape which Magellan named Santa María (today's Punta del Este) and a hat-shaped mountain which he called Monte Vidi, thus naming the future city of Montevideo. To the south in worsening weather, the expedition discovered several ports, and on the last day of March, Magellan sailed his fleet into a safe port with a narrow mouth which he named San Julián. There, in view of the advancing Antarctic winter, he decided to await spring, ordering short rations and sending *Santiago* under Captain Serrano to explore the coast to the south.

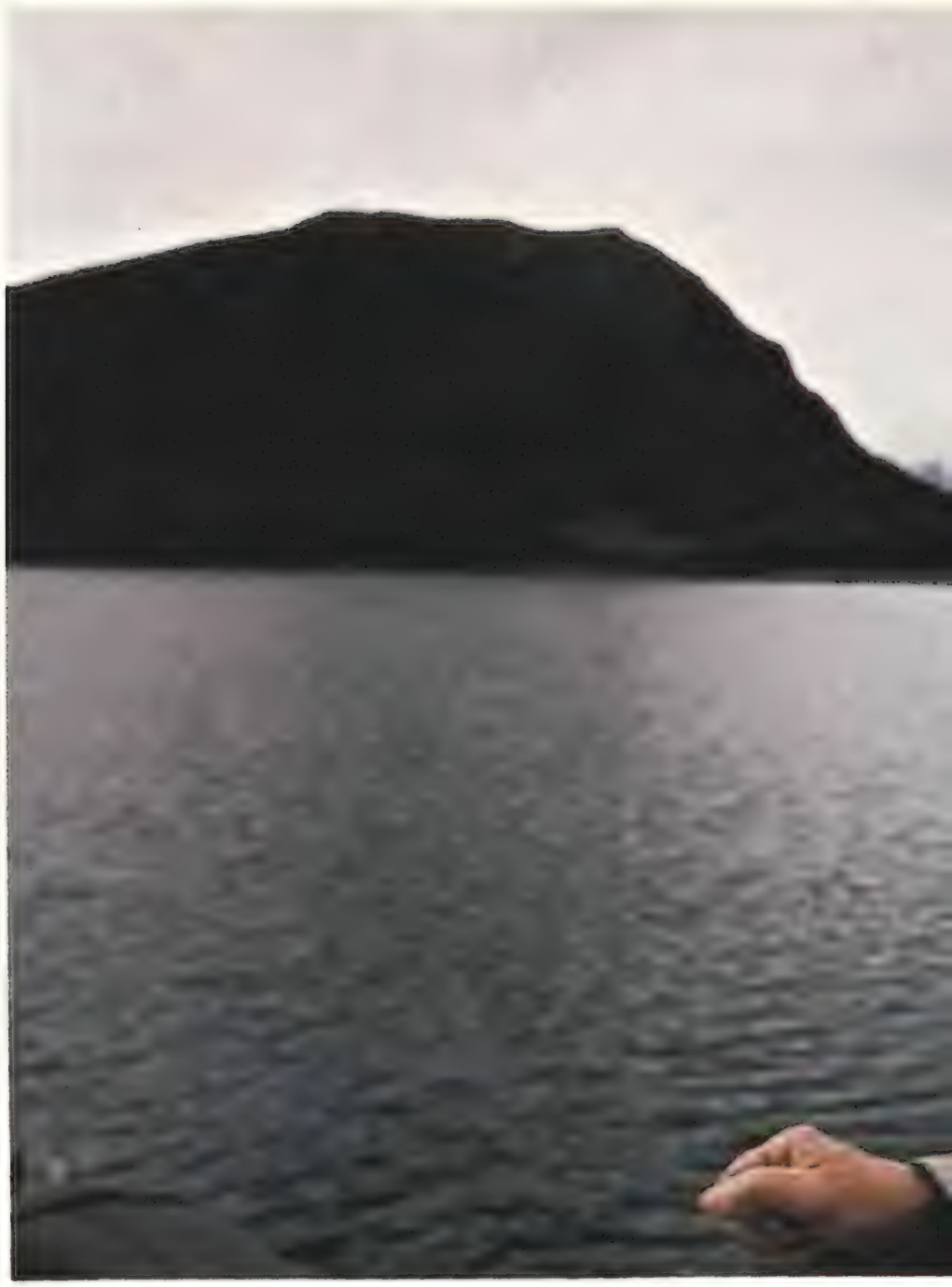
Mutiny strikes!

Next day, Palm Sunday, Magellan invited his captains to lunch on the flagship after Mass, but only nephew Mezquita came. And that night Quesada, allied with Mendoza, boarded *San Antonio* with Cartagena and 30 armed men. They fatally wounded the loyal master and put Mezquita in irons. In one blow *Concepción* under Cartagena, *San Antonio* under Quesada, and *Victoria* under Mendoza had been aligned against Magellan, alone in *Trinidad.*

The mutineers sent a boat to parley, but Magellan had anchored in the narrow entrance of the bay, thus blocking their exit. He arrested the delegation and sent Mendoza in *Victoria* a letter by the commander of the shipboard soldiers, Gonzalo Gomez de Espinosa, who stabbed Mendoza in the throat when he scornfully tossed the letter aside. Meanwhile, Magellan's kinsman Duarte Barbosa boarded *Victoria* without resistance, leaving Quesada's and Cartagena's ships bottled up in the bay.

Poor seamanship undid Quesada. Apparently preparing to run for a break, he weighed two of his anchors, and while he argued with his prisoner, Mezquita, *San Antonio* dragged her third anchor, the strong current took charge, and she fetched up close alongside the flagship. Magellan easily swept her decks with gunfire, and a boarding party soon had Quesada in irons. One imagines Cartagena standing on *Concepción*'s deck in full armor, bellowing orders to which nobody listened, and warding off a shower of bolts from the flagship's crossbowmen. It didn't take long to subdue him, too, and justice was equally swift: Mendoza's body quartered, Quesada beheaded by his own terrified servant and then quartered, Cartagena stranded with a priest. The rest Magellan wisely pardoned.

Captain Serrano in *Santiago,* sent south, had dis-



Admiral Morison, who traced Columbus' voyage in his own yacht, gazes beyond Charles Island.

covered the great river of Santa Cruz, but in exploring further ran his ship aground in a storm. A group of his men walked 60 miles back to San Julián, and Magellan spent two months salvaging *Santiago*'s cargo, fittings and cordage. He kept his men busy all winter, shooting game and salting down the flesh, making sealskin garments and exploring the interior.

Giant Indians began to turn up with their hideous women and their *guanacos*, cousins of the llama, which to the Spaniards looked half ass and half camel. The "Patagones" (big-feet), so named by Magellan for their oversize moccasins, went naked except for loose *guanaco* skins thrown around their shoulders, and they devoured enough stew for 20 Spaniards. They ran much faster than any European and danced, pointing to the sky, crowning their painted faces with dirt and, as a stunt, shoving arrows down their throats and withdrawing them. Magellan captured two by loading their arms with presents, then offering intriguing iron shackles to adorn their feet. One Patagonian agreed to be baptized Juan Gigante (John the Giant) and as a christening present was given all the mice he could catch but he soon returned to his people.

On August 24 the fleet sailed south to Santa Cruz, where it stayed for two months, taking plenty of fish and riding out a great storm. The four remaining ships were now under the command of Portuguese (Magellan's *Trinidad,* Mezquita's *San Antonio,* Barbosa's *Victoria* and Serrano's *Concepción*); and all hands had been clearly warned by Magellan that he would persevere in his search for a strait, if necessary down to latitude 57 degrees south and that, even there, if he turned back, it would not be for Spain but eastward for the Cape of Good Hope and the Spice Islands.

After leaving Santa Cruz, the fleet experienced fair weather, and on October 21, the feast of the Eleven Thousand Virgins, it rounded a high, flat sandy point and Magellan named it Cape Virgins. Behind it lay the entrance to a wide salty bay.

Four hundred and fifty years later, we inspected the coast of Patagonia down to the Strait in Jim Nields' Beechcraft Baron which had flown down to meet us at Buenos Aires. There the Argentine Navy's historian, Captain Laurio Destefani, had arranged for us to attend a special Magellanic session of the Academy of History. Near Deseado we saw the start of the many-ochered rolling Patagonian plain. Circling low over San Julián, we recognized the narrow mouth which Magellan so effectively held, and the deep bay which, though now partly silted up, still offers a safe, snug anchorage. We understood why Magellan, encountering the Antarctic winter, awaited spring in this dreary harbor, but we also sympathized with the rebel captains' reluctance to spend a whole winter in this desert.

We then landed at Río Gallegos, where we were the

guests of the Argentine Navy, took off thence in gathering fog and in great excitement rounded Cape Virgins, flying at about the height of Magellan's masthead. Then both our engines sputtered and quit. Fortunately, when Obregón and Nields switched tanks, which they had earlier forgotten to do, and with the aid of the pumps, the engines started again.

Magellan too had plenty of excitement once he had rounded Cape Virgins. Riding out a storm in the first bay, he sent *San Antonio* and *Concepción* ahead to reconnoiter. They returned, sails full and banners flying, the crews discharging cannon and bursting into cheers, reporting that this was indeed the Strait. The fleet sailed on through the two *angosturas* (narrows) and into a very wide bay containing several islands, on one of which they landed and heard Mass.

Now Magellan consulted all his officers concerning his intention to press on and all approved, except Esteban Gomez, pilot of *San Antonio*. There was some reason on his side; having discovered the Strait why not return triumphant to Spain, fit out a new armada, and head well prepared into "so great a Gulf?" To which another replied, "Better go ahead now that we hold the flower of the summer in our hand." Magellan ended the argument by insisting that he would fulfill his promise to the Emperor even if he had to eat the leather off the yards, which later he had to do.

Another vessel gone

So on the fleet sailed and, as the passage narrowed, Magellan anchored at the mouth of what he called the "River of Sardines," and sent *San Antonio* to explore an alternate route to the southeast (today's Admiralty Bay). She never returned. Poor Mezquita in irons again, Gomez and Jerónimo Guerra took over and sailed *San Antonio* back to Spain.

This River of Sardines has been hard to pin down. According to the chronicles, it must be near another river and several islands and Magellan's longboat must be able to reach the Pacific and return in three days, a seemingly impossible feat from today's Fortescue Bay, the most likely anchorage in these parts. Worse still, a few miles ahead, the longboat must make a momentous choice between the real Strait and Canal San Jerónimo, a seemingly identical passage.

Thanks to the Chilean Navy, after we had photographed the entire Strait from the air, we were able to sail through it in LSM *Orompello*. As we edged at night into Fortescue Bay, where Magellan anchored for several days, the Southern Cross and the two galaxies of the Magellanic Clouds stood high in a baroque frame of moonlit clouds; the watch sang out, *"Así, así; tres cientos veinte; cinco cables; fondo!"* and our anchor chain shattered the gentle stillness of the bay. Next morning we rowed ashore, just as Magellan must have done, and landed on the bank of the bottle-green river, sometimes sinking up to our hips in the virgin "turbal" (from *turba,* meaning peat). Seven-thousand-foot snows towered above us, and around us Fortescue Bay lay still as if Magellan, weeping when he heard news of the Pacific, had been the last to disturb the mossy *Sphagnum magellanicum*.

This sail into the Strait in *Orompello* answered our questions. First, three days in Antarctic summer are much longer than they sound for it is dark only a few hours. Second, the prevailing northwestern wind, which normally funnels into the Strait, is not a constant and *Orompello* experienced whole days of southerlies. Thus it would have been possible, with luck, to have sailed a longboat from Fortescue to the Pacific and back without much tacking. Finally, the choice between the Strait and Canal San Jerónimo is not

difficult for a sailor, since the dark blue waters of the Strait are creased with steady ripples born of a distant swell, while San Jerónimo's wear the green and glassy look of mountain waters, dotted with small whirlpools.

Magellan modestly named his Strait *Todos los Santos* (All Saints) for the day he entered them but posterity has named them after him. The islands to the south he called Tierra del Fuego because of the Indians' many fires that he saw. Fires are still visible, but now from oil wells. Having searched in vain for *San Antonio,* he left two messages ashore marked with banners. Then he sailed on through the breathtaking beauty of the western Strait, beneath a solemn cantata of green glaciers, black rocks and snowy heights, which made Pigafetta exclaim that there could not be a more beautiful or better strait in the world; nor is there. On November 28 they passed the last fair cape, Cabo Pilar, and entered the darkly rolling Pacific whose measure he was still to take.

Death of Magellan

Magellan's lonely course led him straight up the great empty channel which separates the Marquesas and Christmas Island from Tahiti and the Marshalls. Anyone who has sailed the tradewinds can imagine *Trinidad, Concepción* and *Victoria* with wind astern or on the quarter, all square sails set and mizzen probably furled to help the steering. Bluest of blue seas, white fleecy clouds flying to leeward, frequent bursts of flying fish pursued by dorados, ships' boys singing their little ditties every half hour when the hourglass is turned, and longer ones at eight bells.

But to quote Pigafetta, "We were three months and twenty days without getting any kind of fresh food. We ate biscuit which was no longer biscuit but powdered biscuit swarming with worms. It stank strongly of the urine of rats." And the worst affliction was scurvy: "The gums of both the lower and upper teeth of some of our men swelled so that they could not eat." Thirty men got scurvy in the arms, legs and elsewhere and 11 or more members of the crews of the three ships died.

Finally the Philippines. At Cebú, on April 27, 1521, Magellan was killed by a horde of natives.

Concepción was scrapped. *Trinidad* and *Victoria,* laden with spice, gave themselves a double chance to get home, *Victoria* by the Cape of Good Hope, *Trinidad* toward the Isthmus of Panama. Only four of the latter's crew reached Spain.

Elcano brought *Victoria* into Seville's outer harbor almost three years after her day of departure.

Aerial view of Strait—the upper body of water—
is looking south toward Tierra del Fuego.

Metropolitan Museum of Art, New York; gift of Edgar William and Bernice Chrysler Garbisch

This portrait of a family, inhabiting a fanciful architectural setting, is inscribed with the names of Abraham Pixler, his wife and sons. Found in Pennsylvania, the picture dates from about 1815.

By Leah Gordon

Unschooled artists, deft craftsmen in a dazzling show

The diversity and originality of American folk art is celebrated in serious and gay exhibition at New York's Whitney Museum

Abby Aldrich Rockefeller Folk Art Collection, Williamsburg

Only the oddly spelled names identify this picture of George and Martha by a contemporary Pennsylvanian.

"Aristocracies produce a few great paintings; democracies a multitude of little ones," remarked Alexis de Tocqueville, that 19th-century French historian who had something to say about nearly everything in American life. And if, today, Tocqueville were to visit the Whitney Museum of American Art in New York, he would see the works that he considered minor hailed as probably the most characteristic art expression of our nation. For there are more than 200 examples in the exhibition billed as "The Flowering of American Folk Art 1776-1876"—paintings, sculptures and useful objects produced by native craftsmen and nonacademic artists in the years between the Revolution and the nation's centennial.

In a sense, the Whitney's show can be considered both a culmination and a beginning. It is a tour de force of folk art, bringing to light many works which have never been seen before. And it is among the first of dozens of exhibitions around the country that will explore our national artistic heritage as we approach the Bicentennial year.

From the Whitney, where the show is on view from February 1 through March 24, the works will travel to the Virginia Museum of Fine Arts in Richmond (April 22-June 2) and the M.H. De Young Memorial Museum in San Francisco (June 24-September 15).

Selected from more than 10,000 pieces, the 200 items are intended to represent the cream of America's folk-art production, including pottery, weathervanes, ships' figureheads, toys, scrimshaw, quilts and gravestones—nearly everything that touched the lives of 19th-century Americans from the cradle to the grave. Although the works were chosen with the aid of specialists, the show, which is sponsored through a grant from Philip Morris, Inc., is basically the work of two extraordinary women, Jean Lipman, for many years the editor of *Art in America,* and Alice Winchester, the former editor of *Antiques* magazine.

"The best folk art compares with the best academic art of its time and in some instances is better," says Jean Lipman. "A number of gifted folk artists arrived at a power and originality and beauty that were not surpassed by the greatest of the academic painters."

But much that is touted and sold today as great folk art is, in fact, nothing more than grotesque, inept painting. Even in this quality show, a few such pieces have crept in. For example, there is one watercolor showing a coarsely drawn couple in a cardboard embrace, their mouths askew, their eyes crossed. The drawing was probably copied from a print, and the end result is bad art by any standard.

But for the most part, the works on display bear out the contention that in the 100 years from 1776 to 1876 folk art flourished with a diversity and an originality in this country as in no other. Our native craftsmen

New York State Historical Association, Cooperstown

A slave named Job is said to have carved this cigar-store figure about 1825 for a New Jersey shop.

Museum of American Folk Art, New York; gift of Herbert W. Hemphill jr.

A patriotic pasture gate, probably from the 1870s, once decorated the Darling Farm in upstate New York.

and unschooled artists produced a rich body of art that possessed a visceral, ingenuous quality which modern sensibilities often find more appealing than the sometimes belabored, academic efforts of the period.

"Looking at these paintings is like eating olives," says Nina Fletcher Little, a Brookline, Massachusetts, collector. "At first you don't like their sharp taste. But after a while you catch their spell and special appeal."

What is folk art? A semantic battle has been simmering over a definition for the past 40 years and has peaked with this show. Essentially, the debate revolves around whether to lump the naive paintings and sculptures together with the useful objects and call them all folk art. The controversy has become so heated that one important collecting couple, Edgar William and Bernice Chrysler Garbisch, refused to lend to the show from their personal holdings (although many works that they have given to museums will be included).

"These watercolors, pastels and oil paintings are naive," says Edgar Garbisch, whose collection includes only pictorial works. "That's the only proper word for them. Look it up in Webster's. Everything else is folk art—the cigar-store Indians, the weathervanes, the needlework pictures. They belong to the crafts."

Basically, folk art is the art of the lower classes where the craft traditions have been passed on unchanged from generation to generation. But in America, a classless society, folk art refers to useful items made by and for all the people, including George Washington who had a dove weathervane made for Mount Vernon.

Nevertheless, it is a mistake to assume that any pot or shovel conceived by a country craftsman for a rural home is folk art. Only when the maker is so skilled that he can enhance his work with excellent design and endow it with artistic merit is the piece folk art. At that point, the everyday object transcends its purely practical function and becomes a work of art to be admired, cherished and preserved.

Unfortunately, the term folk art has come to be used to describe two distinct categories, and therein lies the confusion and conflict. The first area accurately relates to those objects which stem from the crafts and were made to serve some practical purpose. The other erroneously includes paintings and sculptures by largely untrained artists who are not part of the mainstream of the academic tradition. They remained, as one New York dealer describes them, nonacademic, following throughout their lives a personal style that is today prized for its spontaneity, incisiveness and innocence. "Folk art and American naive painting may share an area of overlap, but it is negligible in comparison with the extremity of the difference between

Leah Gordon, of Time, *has also written on art for the* New York Times *and* New York *magazine.*

them," wrote John Canaday, the *New York Times* art critic. Although the Whitney show includes both groups and, for want of a better term, calls it all folk art, the completely naive paintings and sculptures should not properly be called folk art.

Perhaps more than any other nation, the United States during its first century was ripe to produce a varied and vigorous art tradition. At the time of the Revolution almost three million people lived in the Colonies. Eighty years later the population had swelled to 31 million. Except for short periods, the country was prosperous and, until the 1840s, there were no photographers. Out there were all those faces and landscapes waiting to be painted.

Somebody plastered to the wall

The Americans of the 19th-century had an insatiable passion for paintings, particularly of themselves. "You can hardly open the door of a best room anywhere, without surprising or being surprised by, the picture of somebody plastered to the wall and staring at you with both eyes and a bunch of flowers," observed the American writer John Neal in 1829.

In addition to a willing audience, America also had a band of willing artists—men and a few women without much schooling who would try their hand at anything. In many respects our artists were upstarts. Unlike Europeans, Americans made no sharp distinction between the fine and useful arts. From its very beginnings, the artistic tradition of the United States was linked with the crafts. Charles Willson Peale was an upholsterer and silversmith before he studied painting in England. Even John Singleton Copley complained that people generally regarded painting as a useful trade, "like that of a carpenter, tailor or shoemaker and not as one of the noblest arts in the world."

America had no effective guilds, few art schools and no salons to dictate taste, style or technique. It was every man for himself, and for some it was disastrous; for the talented, a boon. "The new nation had the added advantage of unashamed variety, fluidity and cultural anarchy," explains Daniel J. Boorstin, Senior Historian of the Smithsonian's Museum of History and Technology. "Americans were luckily free of the Royal Academies and National Academies that tended to cast cultures in respectable molds."

Consequently, house, sign and coach painters also doubled as portrait and landscape artists. Young women were trained in seminaries to paint on velvet, to draw with needle and thread and to compose, as Emma Cady did, still lifes combining a stencil technique with free-hand details (right). Even the restless sailors, who sometimes spent as much as two years at sea, whiled away the lonely hours engraving scrimshaw

Abby Aldrich Rockefeller Folk Art Collection, Williamsburg

An anonymous artist painted this watercolor portrait of a demure little girl named Emma Clark in 1829.

Abby Aldrich Rockefeller Folk Art Collection, Williamsburg

The glass compote in this still life, painted about 1820 by Emma Cady, has tiny flecks of mica.

portraits of sweethearts and families on whale's teeth (p. 58). And others, such as a ship's mate named Coleman, aboard the *Joseph Grinnell*, drew with chalk on a board to record the dying whale off the coast of California (pp. 58-59).

A lucky few were exposed to a little training. Erastus Salisbury Field was one of them, having studied with the painter-inventor Samuel F. B. Morse for all of three months. When he did *The Garden of Eden* (below) in about 1860, he based his canvas on a Bible illustration and borrowed additional details from Jan Brueghel the Elder and Thomas Cole. Taking a bit from one and a bit from the other, Field came up with a lush Eden of his own, not unlike an Italian Renaissance landscape. Yet some of his mountains have about them a touch of the Berkshires near where Field lived.

The nonacademic tradition is also not without its geniuses. One of them was Edward Hicks, a Quaker preacher and trained coach and sign painter, who turned out numerous canvases based on the Isaiah prophecy that one day the lion would lie down with the lamb. Into his animal menagerie, known as *The Peaceable Kingdom,* Hicks introduced William Penn and a group of Colonists and Indians signing their famous treaty. Between about 1820 and 1849 he painted this subject over and over again, each time infusing his canvases with a freshness that any accomplished artist would envy.

Sculptors, as such, were almost unknown in the early Republic and like the painters had their roots in

Shelburne Museum, Shelburne, Vermont

The Garden of Eden by Erastus Salisbury Field has a painted, trompe-l'oeil frame that is actually flat.

the crafts. Even William Rush, America's first native sculptor, started out as a carver of ships' figureheads. Some were itinerants, such as the alcoholic whittler Wilhelm Schimmel, who wandered through central Pennsylvania carving eagles, parrots and lions in exchange for booze and board. But most sculptors remained anonymous craftsmen, as did the carvers of the flag gate (p. 54) or the ship chandler's sign (p. 58).

In the 1920s a group of American artists, including Elie Nadelman, Robert Laurent and Charles Sheeler, became attracted to the works of the early craftsmen and nonacademic artists, in much the same way the fauvist and cubist artists earlier in the century were struck by the artistic qualities in primitive African sculpture. "Most of these pictures were merely quaint," remembered Holger Cahill, the late director of exhibitions at the Museum of Modern Art, "but some of them had esthetic value of a high order, and all of them had a quality which gave them a certain kinship with modern art."

By 1924 the Whitney Studio Club, the progenitor of the Whitney Museum, held the first exhibition of American folk art, and in the late 1920s art dealers such as Valentine Dudensing, Edith Halpert and Isabel Carleton Wilde began to handle folk items. Collectors, such as Abby Aldrich Rockefeller, Electra Havemeyer Webb, Henry Francis du Pont and Maxim Karolik were soon building their collections. Today their collections can be seen, respectively, at Williamsburg, Virginia; Shelburne, Vermont; Winterthur, Del-

Abby Aldrich Rockefeller Folk Art Collection, Williamsburg

Getting the correct perspective was no picnic for the painter who did *Outing on the Hudson* in about 1876.

This figure was carved about 1850 to advertise a ship chandler's shop, probably in New England.

Smithsonian Institution; gift of Frederick A. Delano

A pair of 19th-century sailors engraved *Portrait of a Lady* and *Family in the Parlor* on whale's teeth.

Collection Rudolf F. Haffenreffer

aware; and in Boston's esteemed Museum of Fine Arts.

While many people were responsible for assembling the public collections and for honing public taste, few had the unerring eye of a polished, energetic, hot-tempered dealer named Harry Stone. In a decade's time, Stone found and sold some of the finest naive paintings in this country. A Philadelphian, Stone came to New York as a young man around 1905 to work in a bookshop. Eventually he opened his own rare book and manuscript business. While scouring attics for old books, he came across naive canvases that he bought strictly for his own amusement.

When the book business went sour during the Depression, Stone sold out and in 1941 launched his

A ship's mate named Coleman sketched California whaling scene when he was at sea about 1858.

American primitives gallery. One day, while Bernice Garbisch was having lunch, she looked across Madison Avenue into a second-floor window. Her eye was caught by the paintings in Harry Stone's window. Soon, Bernice Garbisch and her husband Edgar were buying canvases for their country home in Maryland and, ultimately, assembled the foremost collection of 18th- and 19th-century naive works.

When the National Gallery exhibited a selection from the Garbisch collection in 1954, more than 40 percent had come from Harry Stone, but by then he was out of business. Afflicted with Parkinson's disease, he gave up the gallery in 1951 and by 1956 was dead.

At this point a new wave of interest emerged, particularly among younger people who found in these superbly designed and richly painted early pieces a warmth that was lacking in slapdash contemporary furnishings as well as a link with the decorative abstract qualities in modern art.

Today the works of the folk artist and the nonacademic painters and sculptors are, as shown at the Whitney, an accepted and recognized genre within the American art tradition. And while these artists do not command the prices, nor the respect, bestowed upon such mainstream counterparts as painter George Caleb Bingham and sculptor Horatio Greenough, they have come, often nameless and lost in history, to take their rightful place alongside the renowned.

Museum of Fine Arts, Boston; M. and M. Karolik Collection

By Daniel Jack Chasan

A great surgeon seeks ways to help faltering hearts

In a recovery room, Kantrowitz ponders a patient's response to surgery and considers the next steps.

Artificial organs may be years away, but Adrian Kantrowitz works on mechanical devices that have to do until the real thing comes along

The physician in the colored jacket is already in his seat for the meeting when a colleague in a white lab coat walks in and stands over him. The colleague is a big man, bald on top, with thick white hair around the sides and back of his head. He is well tanned, wears glasses, and smokes a metal-stemmed pipe, which he holds tightly in one corner of his mouth. He points, straight-armed, at the seated physician and announces, with a generous hint of Brooklyn in his voice, "You've got a good case for the patch." Then he puts his hands on his hips and stands there, looking down. The seated man makes some objection. The big man replies, "Some people said the balloon pump wouldn't work either." Back and forth the conversation goes.

To appreciate this exchange, you have to understand several things. First, because it is the prelude to a cardiology meeting at which all decisions will be made by consensus, the big man's speech is purely a reflection of his conviction and personal style—there is no element of coercion involved. (The consensus is that the patient in question may well turn out to be a good case for the patch, and a long testing process is subsequently begun to find out whether he really is.)

Second, the "patch" of which he speaks is an artificial booster for the heart that consists chiefly of a sausage-shaped balloon inside a Dacron pouch. It is sewn into the aorta, the vessel that carries blood from the heart to the arteries, replacing a section of its wall (see diagram, page 62). After the left ventricle of the heart pumps blood out into the aorta, the valve between them closes. Then the balloon is inflated, pushing blood out through the arteries that leave the aorta, including the arteries that feed the heart itself. The blood doesn't flow back into the left ventricle because the valve is closed. At the beginning of the next cycle, the balloon collapses, lowering the blood pressure in the aorta. Then the ventricle does not have to work as hard to push the blood into the aorta.

Despite the conviction with which the big man speaks of this device and despite the fact that it has been implanted in some four or five hundred dogs, at the time this conversation takes place the permanent balloon pump has been implanted in exactly two human subjects, one of whom died shortly thereafter, and one of whom survived for 96 days—able to be up and around for a large part of that time—before succumbing to a variety of cardiac ailments.

Third, the speaker is no wishful advocate of medical innovation; he is Dr. Adrian Kantrowitz, who was one of the first surgeons to implant cardiac pacemakers after they were developed; the first man in the United States—and the second in the world—to perform a human heart transplant, using the technique developed by Dr. Norman Shumway; one of the early workers on heart-lung machines that can pump and oxygenate a patient's blood during operations; and the chief clini-

Dr. Kantrowitz, wearing magnifying glasses, sews watertight stitches to anchor a vein section which will bypass a coronary artery.

Photographs by Ralph Morse

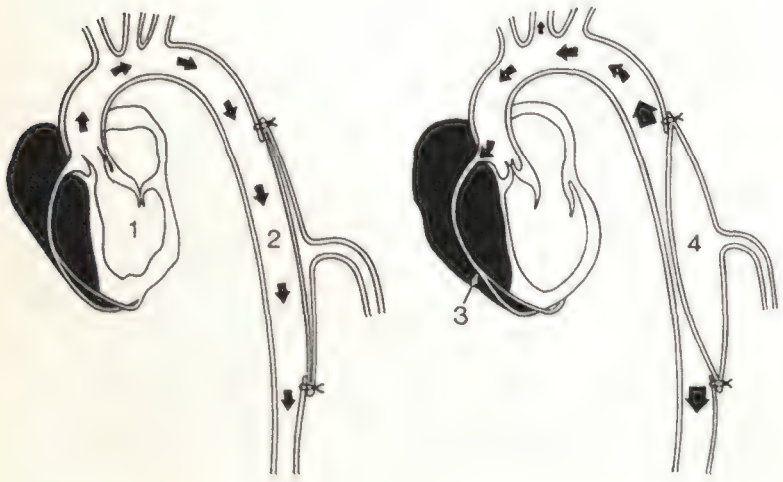
cal developer of the temporary balloon pump, a heart-assist device currently being used in hundreds of hospitals in the United States and Europe.

By now, of course, the use of pacemakers has become routine; they are currently helping to keep Supreme Court Justice William O. Douglas and some 100,000 other Americans alive. Heart-lung machines are used routinely, too. Heart transplants have been a different story. Shumway is one of the few still performing them. Kantrowitz himself abandoned the operation very quickly. "I decided very early that we really didn't know enough about it," chiefly in the field of immunology, he says, "and we still don't." He believes that transplantation was and is worth further research, but in his own work he has turned to mechanical assistance for the heart.

In fact, since the mid-1960s, first at Maimonides Hospital in Brooklyn and now at Sinai Hospital of Detroit, where he is chairman of the department of cardiovascular and thoracic surgery, Kantrowitz and his research team of surgeons, cardiologists and engineers have been working primarily on several forms of the balloon pump.

The temporary balloon pump was first used in a human patient by Kantrowitz at Maimonides in 1967. In the early 1960s, a group of investigators at the Cleveland Clinic Foundation, including W.J. Kolff, S.D. Moulopoulos and S.R. Topaz, had tried balloon pumping in dogs, but found little support for the technique. Kantrowitz' first balloon-pump patient, a 45-year-old woman who had seemed certain to die of shock associated with a severe heart attack, recovered and left the hospital, and he has been using the pump ever since.

Kantrowitz was only one of the contributors to the development of the balloon pump, of course—among



At left the balloon pump is deflated while left ventricle (1) pushes blood into the aorta (2). At right the inflated balloon (4) pushes blood into arteries, including those that feed the heart (3).

In 1967 Adrian Kantrowitz (right) and his brother Arthur, a physicist, were photographed in front

of a projection of the auxiliary left ventricle they developed, a forerunner of the patch booster.

the many others was his brother Arthur, chairman of the Avco Everett Research Laboratory, Inc. in Everett, Massachusetts. And he is not the only person who has accumulated data on its clinical use. But he has been more closely identified with the clinical development of the balloon pump than anyone else.

The balloon pump is used chiefly on patients suffering from what is known as a myocardial infarction. Coronary arteries supply blood to heart tissue. If any of them becomes obstructed, the heart's own blood supply is reduced. If a section of the heart muscle, the myocardium, is severely deprived of blood, it starts to die. The process is called infarction, and the affected area is called an infarct. When infarction occurs, the patient suffers a heart attack. He may go into shock and may well die. Heart disease kills more people in the United States every year than any other illness.

The rhythmic inflation of a balloon in the aorta of a patient suffering from an infarction can help in several ways: It reduces the heart's work load, increases the amount of blood pumped into the body, and increases the flow of blood through the coronary arteries to the heart itself. (Blood flows through the coronary arteries only when the heart muscle is relaxed. By supplying a higher pressure during this period, balloon pumping also directs more blood to needy heart muscle.) Kantrowitz' research group and others have demonstrated that if pumping is started quickly, it can reduce the eventual size of the infarct.

In addition to the direct aid it gives the heart, pumping enables the physician to use other treatment, too. Often, when a patient has suffered a severe infarction, his treatment poses serious conflicts: Certain things could be done to help him, but he is in no condition to tolerate those things. Surgery, for example, may be more of a trauma than he can survive. What the temporary balloon pump can do in such cases is to help the patient's heart survive surgery (or survive until surgery can be performed). Because the balloon and tubing are inserted into an artery in the patient's groin, and moved from there up into the aorta much as a plumber maneuvers a "snake" through a system of pipes, pumping itself can be started quickly, without major surgery or the use of general anesthetic. The pump is not anchored in the aorta, and so the patient cannot move very much while it is in his body.

The patch, which employs the same kind of balloon, in the same rhythm, for the same physiological reasons, is a bit different. It must be implanted surgically, and it is designed to provide permanent support for a patient whose heart or arteries have been damaged too

Daniel Chasan's last article in SMITHSONIAN *(December 1973) discussed left and right in nature, including the hemispheres of the human brain.*

Help for failing hearts

With all connections made, Kantrowitz pauses before taking the patient off the heart-lung machine.

badly to function adequately on their own, even after corrective surgery. Temporary balloon pumping may be used as needed for hours, days or months; the patch is permanent.

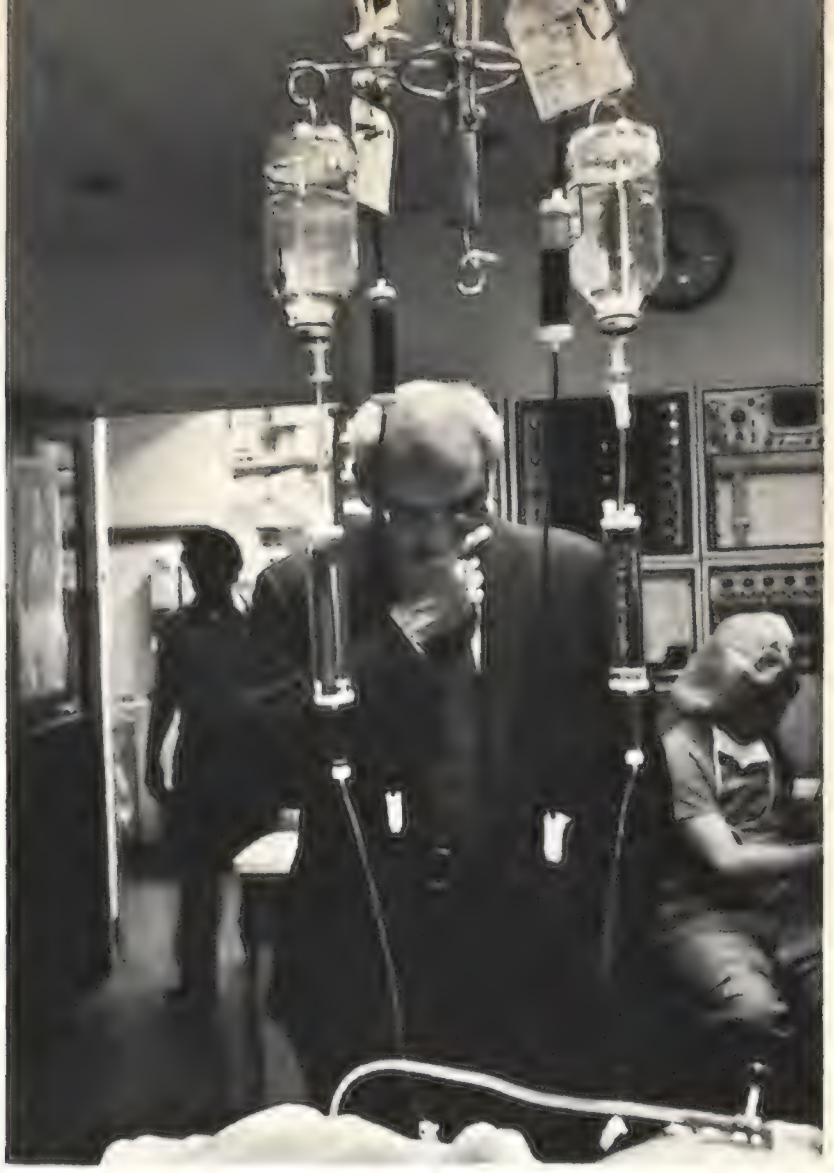
The notion of a partial or complete artificial heart isn't new. Basically, the heart is just a pump. If it fails to function properly, one should logically be able to replace it with a new pump. The transplantation of natural hearts has so far run afoul of the human body's immune reaction to foreign tissue. The use of mechanical devices has been considered since before the first transplants were performed at the end of 1967. In fact, by that time, Kantrowitz himself had implanted a mechanical pump to assist the left ventricle in two patients. The patch is the successor to that line of research.

Currently, both the National Heart and Lung Institute (NHLI) and the Atomic Energy Commission (AEC) are supporting research toward assist pumps and total artificial hearts, and Kantrowitz' concept of the patch booster seems modest in comparison with some of the other projects. Its modesty may be one of its assets. For one thing, by even the most optimistic estimates, a complete mechanical heart probably won't be ready for clinical testing for a decade. For another, since the patient's own heart would have to be removed in order to implant a complete mechanical heart, the device has no margin of error. And, finally, because the patient's own heart keeps on working even if the booster is off, Kantrowitz has sidestepped the very sticky question of reliable power sources.

A patient with a totally artificial heart could not afford to be separated from his power supply at all, unless batteries were also implanted in his body. Such batteries, in the present state of the art, have a weight-to-power ratio which does not allow separation from the outside power source for more than two hours; then they must be recharged. A patient with a patch booster, however, can discontinue its use for hours at a time or, conceivably, indefinitely. He can plug into a power supply at home or at work, or into a source which he carries around with him in an attaché case or wears in a vest.

A disadvantage of the patch booster, or any device that requires tubes or wires leading through the skin, is that the opening in the skin presents a constant risk of infection. Also, there is the inconvenience for the patient of having to plug into a stationary machine, or to carry his own machine and power source around with him. Complete artificial hearts could be made with external power sources, too, but because of the risk and inconvenience involved, most artificial heart researchers are devising ways to implant the power source along with the heart. However, batteries not only have to be recharged every couple of hours, but they would have to be replaced at least every two to four years, which would require surgery. Consequently, both the NHLI and the AEC have been examining the possibility of a nuclear power source that relies on the radioactive decay of plutonium, which would be good for at least ten years. The trouble is, radioactive power sources emit radiation. They can be shielded, but the emissions can't be contained completely without making the package too big and too heavy. Conse-

Kantrowitz uses a punch to make holes in the sternum (breastbone) so it can be wired together again.



A late evening decision has to be made about whether to reopen the chest of a patient.

quently, some radiation would continuously escape.

A committee established by the NHLI to study the implications of the artificial heart program recently recommended that the United States avoid committing itself to a nuclear power source. Even so, both the NHLI and the AEC have been pushing nuclear power sources pretty hard, and the research now in progress is undoubtedly going to continue.

Kantrowitz is probably well out of that controversy, but that is not to say that his work is entirely noncontroversial. He himself is highly respected in his profession, and balloon pumping has become a widely accepted technique.

But there are people who simply don't believe that balloon pumping has ever been conclusively proven to work. Were the patients on whom Kantrowitz first tried balloon pumping really *that* sick? Was it really balloon pumping that saved them? One director of surgery in a university hospital says that he has studied the records of Kantrowitz' early cases and, frankly, he is not at all sure. He doesn't suspect Kantrowitz of juggling the evidence, but "Kantrowitz did a lot of things for those patients beside balloon pumping, and I'm not convinced" that balloon pumping alone made the difference.

Dr. Clarence Dennis, now special assistant for technology in the office of the director at NHLI, has no such doubts. When Kantrowitz first used the pump at Maimonides, Dennis was chairman of the surgery department at the State University of New York Downstate Medical Center in Brooklyn, with which Maimonides is affiliated. "I'm convinced," Dennis says, "that many of those patients would have died if he hadn't used the pump on them."

Kantrowitz, of course, is completely convinced that the pump works. Looking at an electronic display of the arterial blood pressure of a patient who is being pumped, he says, "Watch what happens when I turn it off." He does. Then he turns it on again. Then off again. Then on. "Isn't that dramatic?" he asks. It certainly is. When the pump is off, the graph makes it clear that the patient's heart is working much harder.

Kantrowitz has gained confidence in his own judgment from working directly on human hearts. For years he has made delicate repairs, and he knows just what his hands should feel at every stage. His experience and confidence show clearly during a four-hour coronary bypass operation, a recently developed and now widely used procedure in which pieces of vein from another part of the patient's body are used to bypass obstructed arteries that no longer adequately serve the heart. During the operation, Kantrowitz looks up at the monitoring instruments' display and sees that the reading for the patient's central venous

pressure is improbably high. The anesthesiologists tell him that the machine seems to be working, and that they have hooked it up correctly. Kantrowitz, who is holding a plastic tube that protrudes upright from the patient's heart, persists. "I *know* [the pressure reading should be different]," he says, "because I'm taking it myself. Right in the vena cava. Just like Harvey did it in a horse . . . more than 300 years ago."

As the operation progresses, he argues with the nurses and residents, kids them, jokes with them, sings, hums and delivers little soliloquies, often at his own expense. He also keeps up a running commentary on his work that begins with pessimism ("This is terrible surgery"), grows more optimistic after a while ("That isn't bad"), and ends in elation ("Look at that; it's beautiful"). A few of the people in the room obviously find some of the kidding, and some of the argument, a little hard to take, but in general the routine keeps morale at a remarkably high pitch.

It also obviously helps Kantrowitz himself work off tension—which is no small advantage, since despite the sideshow of repartee, the basic work of the long operation is delicate and arduous.

The operation Kantrowitz is doing is a triple coronary bypass. That is, the major coronary arteries—the right artery and both of the large branches of the left one—are obstructed, and all of the obstructions must be bypassed. A resident takes a length of vein from the patient's leg. Kantrowitz then cuts it into three pieces, including a short piece that he sews to one of the two longer pieces to form a "Y." The single length of vein must go from the aorta to a point on a coronary artery right next to the heart. The base of the Y must also connect to the aorta, and the ends of both branches must also wind up on the arteries close to the heart. All of this requires six watertight joints, which are created with a great deal of meticulous stitching. The stitching is very fine work, and it requires total concentration.

While Kantrowitz is making the Y-graft in the vein, he lets one of the residents do a little of the stitching. At one point he encourages the resident, telling him, "That's much better; you're much gentler with the tissues this time." But a little later, when the resident doesn't seem quite gentle enough, he roars, "This is vascular surgery, Dr. ——, *vascular surgery.*"

Yet sometimes the residents are too cautious. Repeatedly, they have to hold vein or heart out of the way while he works. Toward the end of the operation the heart must be moved particularly far out, so that he can reach the left rear of the organ to stitch into place the end of the vein bypassing one of the arteries. Although occasionally Kantrowitz must warn a resident not to pull the heart all the way out, more often he must tell residents not to be afraid, to pull harder. (Later, he remarks on how much the heart can be pushed and pulled during an operation. "You know exactly how far you can go," he explains. "You know because you've gone too far and torn the heart. That's the only way to learn how far you *can* go.")

After the operation and a look at the patient, Kantrowitz has started to unwind, and he is in a reflective mood. Heart surgery "is a very powerful tool," he remarks at one point, "but it took a lifetime to learn. A lifetime." He smiles. "A lifetime before you have the confidence to argue with the anesthesiologists. You do it until you're too old [he himself is only 55] and in the meantime you train younger men."

Perhaps his fatigue after the operation and the need to drive himself to finish his hospital rounds in what is left of the afternoon have brought on this train of thought; a little later, he returns to it again. But there is no noticeable lack of vigor as he strides through the hospital corridors, visiting all his patients who are recovering from surgery (a native of cities himself, he is clearly pleased that one of his patients is a real working farmer), going to check the x rays for tomorrow's operation, which no one is around to show him, checking today's patient again, and visiting the man on whom he will operate tomorrow.

His bedside manner is rather bluff. It seems to be a good way to treat people who are inevitably scared stiff about impending surgery, but it doesn't seem to be an act. Certainly, the note of confidence isn't false. When he tells the man's wife, "We'll give him a new set of arteries tomorrow" and "We'll fix him up as good as new," you haven't a doubt in the world that he means every word.

Kantrowitz feels a patient's toe to check circulation after a coronary bypass operation.

By Stuart Silk

Climbing the Tetons was too exciting

It started as a winter holiday from drudgery and smog and became a race for survival in icy cold, blinding storms and avalanches

Forty miles on cross-country skis with an 80-pound pack on your back and spending nights in ice caves in December isn't everyone's idea of joy. But for me, 16 days in the Grand Teton National Park were a needed escape from New York. I convinced Georgiana, my 22-year-old sister, that it was what she had been dreaming about, too—although not without considerable coaxing (and later assuaging). And so we headed for Driggs, Idaho, where our expedition was being organized by Tom Warren of National Outdoor Leadership School (NOLS). Objective: Ski 20 miles into the Tetons, set up base camp in snow caves, climb as many peaks as we could.

At 9 A.M. December 9, a beautiful crisp day, temperature 18 below, we set out on Army surplus cross-country skis, laden with our packs. All of us were experienced mountaineers, but only a few had done cross-country skiing and only one had done it with a pack. We stopped every half-mile for water, or simply to get the beast off our backs. Our way led gently up the floor of the massive U-shaped Teton Valley.

It was almost dark when we crawled under some lofty pines to make our first camp. In the silent clear air of evening the temperature dropped, freezing the day's sweat to our bodies. We found it very difficult to set up tents and make dinner on single-burner stoves. The temperature kept dropping: —20, —30, —36, —40. I discovered that basic comfort required full concentration. There was no socializing or reading; we all learned quickly what we had to do just to stay alive.

At 7:30 P.M. I was in my sleeping bag, Georgi beside me in hers. Together we wondered what in God's name we had got ourselves into. There was an inch of frozen condensation that hung from the roof of the tent next morning, and fell on our exposed skin as we tackled the miserable job of dressing, that almost broke us. Georgi refueled the stove, tried to light it, chilled quickly, had to go out to the bathroom and returned in sobs. She went to Tom Warren and pleaded that she had to go back. I couldn't advise otherwise, since I was myself nervously fighting frostbite in my toes. We began to realize that out here there would be no warming hut. Tom was cold too, but uncompromising with my sister. He told her that, once you start something like this, you have to finish.

Demoralized, we all finally got off, hiking up the canyon until noon. In the afternoon we set off on the "big climb," a steep 900-foot slope. We fastened sealskins under our skis to inhibit backward slippage. Everyone fell while trying to do kick turns on the steep switchbacks and, when you fell, you had to take off your heavy pack before you could stand up and put it on again. Sam, an overweight 28-year-old architect with virtually no skiing experience, went through the killing routine of taking off skis and pack every time there was a kick turn because he could not manage his balance.

At 4:00 in the afternoon Tom and Geno, the other instructor, stopped to camp. I was not far behind. Georgi miraculously came next, only an hour behind me. Her progress gave her renewed strength. Under the full moon the others trickled in until 7 P.M. These were strong guys but they lacked skiing experience. Scott, a wiry independent sort, decided at one point that he would set up his camp right where he was. Someone talked him out of it. Tom went most of the way back down for Gahn's pack. Only 16, Gahn was a good climber but in poor shape. Only the bearded, ebullient Daniel could rise above this experience.

Crashing on the downhill run

That night's campsite was the most beautiful of the trip, with a clear view of the splendid ridge. Next day after lunch we had our first downhill experience, and found it just as difficult as the upward grind. Sealskins are unpredictable, sliding jerkily, and the momentum generated by your pack makes you crash. I was all blustery confidence, for I've been skiing all my life. But after an hour I had buried myself more times than I can remember. Cold and demoralized, my pack strap broken, I crawled into bed with a fever and Georgi had to make dinner.

In the gray, snowy dawn I sewed my pack strap back together, and soon we were off, moving quickly as we

Georgi Silk, the author's sister, takes a break on the grueling trip into the mountains.

Equipment is stacked outside a cave, carved out of deep snow at the side of a cirque.

were becoming used to the weight. It was steep at first, then flat through the trees. I led for about an hour, which was much tougher than following in the already broken tracks. Cliff took over, then Sam, who had to negotiate some steep switchbacks and exhausted himself. Cliff took over again, and this time burned himself out. Although it was a full-time job to take care of ourselves, there were many who tried to do more for the group. Part of this stemmed from Tom's disquieting aloofness. He would do little outwardly for us, forcing us to carry the load ourselves. This was his way of having people discover their strengths.

We woke to a sparkling day, hiked up to the saddle below Table Mountain and for the first time saw the Grand Teton with the sun glistening against its western face. From the summit of Table Mountain to Cascade Valley is a sheer drop of 4,000 feet. It makes you feel very small.

In the sunny cirque below the pass we ate nuts, raisins, M&Ms and cheese, and then we were off on the last leg of our inward journey. For the first time I felt at peace, finding it very special to be in this stark region where only a few venture at this time of year. I was intoxicated with the vastness, the whiteness, the power of the peaks.

In three hours we reached the site of our snow caves, a large sinkhole at 10,500 feet at the head of the south fork of Cascade Canyon, surrounded by half a dozen towering peaks. We sat back against our packs, tired, happy and awestruck. It was a very special moment.

Building three snow caves took us into the night. We burrowed out ten-foot tunnels and hollowed out sleeping chambers. Caves provide excellent insulation from the subzero temperatures. Our record high inside was 37 degrees, although normally the temperature hung just below freezing. Georgi and I were cavemates with Tom and Geno. There were four in another cave and two in the third.

Two nights later a Teton storm swept in and all we saw was white on Saturday. The snow raged on through Monday, Tuesday and Wednesday. We were confined to the caves, talking, eating and reading. Tom gave a lecture on avalanches: how they occur and what to do when someone is buried. Fascinating.

That same night after I slipped off to sleep I was suddenly jolted awake. "Stuart! One of the caves has been buried by an avalanche." Stunned, I threw on gloves and a windbreaker and ran out. An avalanche had indeed cascaded from the cliffs above, burying the four in the cave closest to the wall. Geno had fortunately heard the muffled roar (insulated by the caves it is hard to hear anything from outside).

We grabbed pots and a shovel. Tom had started digging with his hands where he thought the tunnel entrance should be. Six feet of snow left no trace of the

The author, a Yale graduate architecture student, age 25, has skied and climbed mountains all his life.

Peak of South Teton, 12,505 feet, seen from snow cave camp, high on its flank. The party climbed it.

cave. Tom took a telescoping ski pole to the bottom of the sinkhole to probe for bodies as the entire cave might have been swished away. He found gear only.

Gahn, Scott and I probed for the top of the cave. If it had not collapsed we should be able to locate the cavity. But our eight-foot probes found no trace, nor could we hear any sounds. I felt that I was not deep enough; with a pan I dug deeper. It was like cement, for the snow friction created by an avalanche melts the snow—which of course freezes afterward. Again, probing brought no response. An hour had passed. I could only believe that their cave had collapsed or that they had suffocated.

Suddenly I heard tapping below. I called to the others, then probed several times at an angle. And at last the probe was jerked from below and pumped wildly. Wonderful! We enlarged the hole to insure a flow of oxygen. I called, "God bless you." Roger replied, "Thanks, man!" They were all four together and all right. Two hours had passed by the time they finally squeezed out on their bellies. They told us that they had waited for us anxiously, only concerned with whether the other caves had been covered, too. The avalanche had missed our cave by only a foot.

Late Thursday afternoon a cold breeze blew away the storm, and we saw the peaks for the first time in five days—but how different, whiter than white. We slept that night believing we would awake to a beautiful day. Instead, we had our sixth morning of a snow-drifted entrance. Another front had swept in. Sullenly we ate breakfast and at 9 A.M. Tom said that our provisions were too low and we would have to move. We were off at 10:30, taking a different route up the ridge behind us which had launched the avalanche, and over a broad couloir. Once we cleared that, we anticipated little difficulty getting out to the road.

The slope soon became too steep for our skis and we had to carry them. Then, close to the top, we had to put on face masks. We walked across the steepest part of the couloir and up over a cornice. Visibility was no more than 20 feet, and the wind raged at more than 80 miles per hour. Georgi came across fifth. As she came over the cornice, which had a frightening exposure, I saw that one of her sealskins had come undone. Geno noticed too; we knew that if it came off she would fall and disappear into the blind void below. She made it.

At dark, exhausted, we made camp and discovered that most of our gear was wet. Sleeping bags held puddles of water. Yet we remained warm, for wool retains 80 percent of its insulating ability when wet, and Dacron does not mat the way down does. Nonetheless, only a few of us slept and we got up at about 5 A.M. It would be dark for several hours more, but we wanted the night to end. We also knew we had a long last day in front of us. We had gone six miles the day before, leaving 11 still to go.

While readying ourselves we were startled by the roar of an avalanche. Soon there was another—triggered by heavy wet snow—only a few hundred yards away.

We started off eagerly but our skis began to stick. We tried all the waxes, but realized that it was useless, so resigned ourselves to no-glide and five additional pounds under each foot.

By noon, after six hours of this torture, we had traveled four miles. Nearly seven remained. I felt we could not carry on. I stopped and pulled off the trail. Cliff and Georgi passed me, with only Tom bringing up the rear. We talked. Suddenly, Tom yelled: "To your left!" I twisted around. What I saw was the most frightening thing I've ever seen in my life—a cloud of snow-smoke 100 feet high bearing down upon us. I didn't look long. I didn't have to. The image will always be in my mind.

Tom had already dropped his pack and was running desperately on skis like an injured frog toward the pines only a few feet away. I followed and we crawled under the bows to a trunk. I grabbed a last gasp of oxygen and clutched Tom's leg as the swish of powdered dust swirled and engulfed us. But there was no pressure. We waited a second longer and got up. The avalanche had split, missing us by a ski's length on one side and 30 yards on the other.

I ripped off my pack and looked for Georgi. Almost immediately we heard her yelling below us. She had been swept by the great wave but, through the violent rolling, had come up on top with only her legs buried. She had lost skis and poles but was otherwise intact.

Cliff was still missing. We searched and found him buried, except for the top of his pack and part of an arm sticking out at a grotesque angle. His pack frame was destroyed, as was his oak-handled ice ax. His neck and back were pressed up against a scrub pine. With the snow already freezing, it took us 20 minutes to dig him out. Incredibly, he was all right. Both reported having the sensation of being caught in violent surf. Everyone searched for lost skis and poles, and we found one set which was given to Georgi. Cliff would have to wade out.

We hiked for a mile and ate lunch. Geno gave Cliff his skis and began to walk. We assumed we would catch up with him. The final hours were more grueling than ever. Then I saw the pickup truck with Tom's wife—and Geno beside her. He had waded through an hour before. She had apples for all of us, the most delicious fruit I ever tasted.

With winds whipping snow at 80 miles an hour, group crosses a couloir. Avalanche struck soon after.

By David Nevin

The irresistible, elusive allure of the ivorybill

Suspect tapes, withheld photographs and high emotion: symptoms of the mystery of the ultimate in ornithological prizes

Audubon's pileated woodpeckers: Quick glimpses by hopeful watchers keep the ivorybill dream alive.

The ivory-billed woodpecker is a magnificent bird. It stands 20 inches tall and seems strong as an axman when it chops away bark. And it is rare—so rare that it may already be extinct and the most optimistic estimates are that only a dozen pairs survive in remote Southern swamp forests.

For its rarity, its beauty and perhaps most of all the plain mystery of whether it survives, the ivorybill seems to capture people's imagination. Each report of a serious sighting is greeted with wide general interest, newspaper stories and real excitement in birding societies. But the odd thing is that among serious professional and amateur ornithologists, these sightings also spark a series of emotions—anger, suspicion, disappointment, wounded feelings, even hints of jealousy—that are anything but scientifically objective.

The situation is complicated by the fact that the ivorybill has a near cousin that constantly is mistaken for it. The pileated woodpecker is smaller and its markings are a bit different, but at 17 inches it's still a stirring sight and it calls the rarer bird to mind.

This is just the sort of situation that raises that quite human capacity to see what one wants to see. Some birders compete as fiercely as golfers, and an ivorybill on one's life list is an ultimate prize. Everyone fighting to save some remnant of wilderness knows his hand is much strengthened by the discovery of a rare species on his ground. For a few people the search becomes downright obsessive, which naturally raises the suspicions of scientists. So an atmosphere of skepticism comes to surround each serious report of an ivorybill sighting—sightings that for some two decades have never been quite conclusive, let alone confirmed. Naturally, however, this skepticism irritates the person making the report, especially when he considers himself fully as qualified as those who question him.

Rare in Southern swamps when Audubon painted them in 1829, the ivorybills may well be just a memory.

In the fall of 1971, Audubon Field Notes carried an item saying an unidentified amateur had photographed an ivorybill in Louisiana. The most significant point was that the note came from Dr. George H. Lowery jr., director of the Museum of Natural Science at Louisiana State University and one of the most respected ornithologists in America.

Lowery did not see the bird himself, though he has

Last certified photographs of ivorybills (female in hole) appeared in James Tanner's 1935 monograph.

full faith in his informant. To protect the bird from the birders and wildlife photographers who might invade the area and drive it away, Lowery never identified the man or said where the pictures were taken, though apparently the place was in or near the Atchafalaya swamp. In any event, the bird disappeared.

In the meantime, despite Lowery's reputation, a backwash of doubt and challenge grew around the suspicion that perhaps the pictures were fakes. This didn't question Lowery's integrity but it certainly questioned his judgment and he, a professional and a gentleman to the core, lapsed into irritated silence.

Ivorybills in Louisiana

We will return to the pictures, but the perspective in which they should be seen goes back 40 years and starts with this same George Lowery, then a student ornithologist. In 1933 a Louisiana politician named Mason Spencer reported ivorybills around a camp he maintained in a virgin forest in north Louisiana. This was exciting because the bird was widely believed extinct in the 1920s. Lowery's father knew Spencer and took his son to Spencer's camp. On Christmas Eve, 1933, they were in the forest with an old woodsman. "Listen," the man said suddenly, and in the silence they heard the bird's distinctive cry—high, nasal, tinny. (Four decades later, smiling in the pleasure of recollection, Lowery suddenly made a startling imitation of that inhuman cry—*"kent, kent-kent, kent!"*—to the surprise of those in the faculty dining room at LSU.)

Following the sound that day in 1933, the little party found two pairs of ivorybills feeding on a dead magnolia tree. In the fall of 1934, at his first American Ornithologist Union convention, Lowery gave a brief paper on the birds. In the audience was the great ornithologist, the late Dr. Arthur A. Allen of Cornell University, who spoke to Lowery about going in to photograph the birds and record their calls.

The pictures and recordings that Allen's party made the following spring are standards today. In his party was a young Cornell graduate student, James T. Tanner. Allen saw the need for a complete study and the National Audubon Society agreed to sponsor it. Tanner was chosen to make it and he worked on the bird for three years, earning his doctorate in 1939 and writing a book, *The Ivory-billed Woodpecker,* which remains the definitive work on ivorybills.

The bird may never have been plentiful. Mark Catesby described it as rare in 1731, as did Audubon a century later. Tanner searched across the South but actually found it only in the original place, a large tract of virgin timber in northeast Louisiana near Vicksburg, Mississippi, known as the Singer Tract because it was owned by the sewing-machine company.

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The ultimate ornithological prize

Ivorybill was painted by Chicago scientist W. J. Beecher who believes he saw one in the Big Thicket of Texas.

Tanner followed the birds for months. Each morning he was at the nesting tree before the ivorybills, late risers, stirred themselves. One would emerge, climb to the top of the tree, preen and stretch and finally call its mate and set out to feed. They flew in a straight line, not undulating, more like a duck than a woodpecker, and usually went a quarter-mile or more, lighting on a dead tree to feed. They ranged widely, each seeming to need about six square miles of feeding area.

The birds Tanner watched fed largely on a particular borer which is the first to invade dead trees or limbs. No other bird is strong enough to knock off the still tight bark, so this food supply, which is very abundant while it lasts, belongs to the ivorybill. But while a pileated will feed on a tree until it collapses and can do nicely on ants, the ivorybill seems to depend on this particular grub. It may be more a matter of necessity, however, than of selectivity. The ivorybill faces stiff competition. In the Singer Tract, its ratio was 1 to 36 pileated to 126 red-bellied woodpeckers.

This need for an ever fresh supply of dying trees led Tanner to his feeling that the birds require virgin timber. The ivorybill's disappearance does seem to have coincided with the rapid logging at the turn of the century. Some forests have recovered and could support the birds, but it doesn't follow that the birds could regenerate themselves. Ivorybills don't migrate, and while they probably are somewhat nomadic, there is no known way for them to move on to some distant forest when their own is destroyed, let alone return when it recovers a half-century later. This point is key to the whole question of the bird's survival and to the continuing reports of sightings.

A Washington-area free-lance writer, David Nevin recently became editor of The Southern Journal.

It explains why Tanner, now heading the Department of Ecology at the University of Tennessee and still the ivorybill authority, is so dubious about reports that put the bird in cutover timber. But since few sightings come from virgin timber, of which there is little left in this country, this also explains some of the tension that exists. Lowery's pictures, for instance, were taken in cutover timber. Tanner's critics feel that he is too rigid on this, that he has published his thesis and now he defends it. Inflexible, say those whose reports Tanner has rejected. At this, James Tanner only smiles and says that while he admits the possibility of the bird in cutover timber, he seriously doubts the probability.

Tanner last saw the birds in 1941, after logging had started on the Singer Tract (it is in soybeans today) and there were other occasional sightings that seemed valid. But these faded and there has not been an unchallenged sighting of an ivorybill in some two decades. Yet reports of the bird's existence continue to appear and the U.S. Fish and Wildlife Service keeps it on the endangered species list. Few ornithologists

would insist either that it is extinct—or that it isn't.

Many reports appear sound but have no real meaning. One of the country's great authorities on birds, Dr. Alexander Wetmore of the Smithsonian Institution's National Museum of Natural History, gets many ivorybill reports. Most can be dismissed easily, but a few cannot. One such was a sophisticated report published by two amateur naturalists who believed they located an ivorybill in a central Florida swamp. They found nesting holes and said they saw or heard the bird 11 times in 43 searching days spread through 1967 to 1969. A nesting tree fell and in an old hole they found several feathers, one of which Wetmore identified positively as that of an ivorybill. Was the bird thus positively recorded? No indeed.

Enter the skeptical field man

"All I know is they sent me a feather," Wetmore said. "It was well worn. It could have been 20 years old." This case brought in Paul Sykes, a U.S. Fish and Wildlife Service field research biologist assigned to endangered birds in the southeast. Sooner or later Sykes gets involved in every serious ivorybill sighting and he has explored so much and found so little that he has become wary of all reports. A man of emphatic convictions and intense skepticism, he is one of the chief questioners of the pictures Lowery is holding. Sykes made two trips into the swamps with the Florida amateurs and was not impressed; the sighting remains unconfirmed.

To keep exploring Big Thicket (above) for ivorybills is a pursuit some ornithologists believe futile.

The most embattled ivorybill searcher is a professional field biologist named John V. Dennis, who has devoted a good part of his life to establishing the existence of the bird. His very dedication—and the enthusiasm that sometimes accompanies it—has had the anomalous effect of making him suspect in the scientific world. A plain-talking woodsman with an angular personality that sparks when rubbed awry, he earned a master's degree with a thesis on the ecology of woodpeckers in central Florida, and he certainly knows woodpeckers. He did not pursue a doctorate and he has suspected ever since that those of his critics—like Tanner—who hold doctorates look down on him. "Ph.D. snobbism," he calls it.

He first saw the ivorybill in 1948 in Cuba, where he had heard that loggers had seen the bird in Oriente Province. He was searching in virgin timber when a woodchopper directed him to an area that had just been logged. (Tanner's eyebrows rise at the very mention of this terrain.) Here, Dennis reports, he found a pair of ivorybills nesting and whacking away at live trees, perhaps in search of ants.

Dennis remained interested in the ivorybill and in 1966 he received a small grant to support an intensive search for the bird. There was a sighting reported in the Big Thicket, a swampy wilderness north of Houston that long has been the object of a battle between conservationists and timber companies. Dennis began prowling a remote section of the Neches River swamp, an area of logical ivorybill habitat that hadn't been cut for years. One day, from a point a mere 50 feet from him, the bird suddenly flew up from the ground ("very unusual for an ivorybill," Tanner later observed, "very unusual"). The bird flew across a bayou, lit for a moment on a tree and then flew on in a straight line. Dennis waded across the bayou and followed and soon saw a big woodpecker on a stump with its wings partly extended. It was an ivorybill, he said, though he couldn't determine its sex, which means he couldn't see its head. Then it flew on and disappeared.

Since he felt the bird's existence there was thus established, Dennis decided to broaden the search by interviewing area people. Now he believes he communicated his own enthusiasm, but in any event many people told him they had seen the ivorybill. As a result, he issued a report estimating that five to ten pairs existed in the Neches River swamp alone. Now he says ruefully, "Probably I gravely overestimated."

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CHILDREN, INCORPORATED

Plain-spoken, enthusiastic John Dennis knows woodpeckers—but has no Ph. D.

His report created a sensation. The *New York Times* put it on the front page. He addressed an Audubon convention. There was jubilation among those interested in the Big Thicket. Gradually, however, the reaction to Dennis' admittedly overstated report swung around to challenge and doubt. Stung, Dennis returned to the Big Thicket determined to find the bird and thus still his critics, and in this he failed. On a February morning in 1968, however, he heard the bird. He turned on his tape recorder and caught about three minutes of its call. He searched afterward but couldn't find the bird.

Here, however, was physical proof. But to his dismay, his recording, marred by background noise, seemed to focus the storm of suspicion that his original report had roused. The tape was widely doubted, someone even being so unkind as to suggest that it was a fake made by rolling a pencil across a table while the recorder ran at half-speed. It also was suggested that what Dennis had recorded was another birder out in the woods playing the original Cornell tapes in the hopes the bird would answer, which is a standard ploy in searching for ivorybills.

Then came the final crusher. Paul Sykes, the skeptical field biologist, and Tanner were sent to Texas to check Dennis' findings. The results were grim. Tanner holds a low opinion of the Big Thicket in general and an even lower opinion of it as potential habitat for ivorybills. He readily admits that when

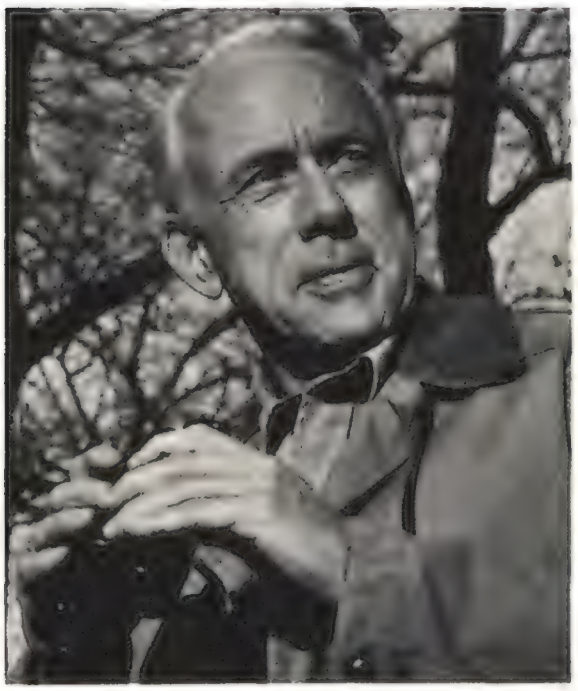
he went to check Dennis, he didn't expect to find ivorybills. Neither he nor Sykes was impressed with Dennis' field technique and within two weeks they reported that they believed Dennis mistaken.

So Dennis' report was shot down (though his tapes are being analyzed again) and there the matter rested until the pictures arrived on Lowery's desk at LSU. Despite his role in Tanner's original study, Lowery has not specialized in the ivorybill, but as the area's leading ornithologist, he often gets reports of the bird. The man who sent the pictures had written several times to say he had seen the bird and each time Lowery had answered noncommittally. Now came the pictures.

He turned out to be a real estate operator in his middle fifties, a city man with a college education living in a handsome city home, whose addictive hobby was bird hunting. He was training his dogs on May 22, 1971, when a pair of ivorybills flew past him into the woods. His dogs already were caged. He took an inexpensive little camera and followed the birds. The female had disappeared but he saw the male on a tree and photographed it twice before the bird flew on and vanished.

The image the film captures is that of a male ivorybill at rest on the side of a tree. Both pictures show the characteristic white saddle across the back looking like a broad arrowhead pointing downwards.

At last! A photograph of the elusive bird. Lowery reported to colleagues that "the location was not in virgin timber,



Cautious or merely intransigent? Dubious James Tanner wrote the definitive work.

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long presumed by most people to be necessary for survival of this species." So much for Tanner.

But the challengers appeared immediately, among them the skeptical field biologist, Paul Sykes. The question was whether the bird was alive when photographed. Though the trees were different, the bird appeared the same in each picture and there were two oddities. First, though the side of the bird's head with the characteristic white stripe could be seen, the white bill was not visible. Second, the bird's body was vertical and parallel to the tree trunk, which is unusual because an ivorybill normally leans back on its tail feathers as it grasps the bark so that it has the appearance of rearing back from the tree.

Challenging Dr. George

It hurts Sykes to challenge Lowery, whom he admires and refers to respectfully as "Dr. George," but the pictures still don't persuade him. He suspects that the bird is stuffed and that it was mounted on the tree for the pictures. The missing bill could have been shot off if the bird was killed. Asked his opinion of the pictures, Tanner says quietly, "I haven't seen them. I had hoped George would send them to me, but he hasn't."

Secret doubts may be touching Lowery himself. He has refused to release the pictures for publication, which blocks further examination of them.

But why would an unidentified man with no chance for profit or fame hunt up a stuffed ivorybill and go out in the swamps with climbing irons and go up 30 or 40 feet to mount the bird—and do it all twice—just to fool a pleasant man whom he had never met?

Lowery retains his faith in his informant's honesty. Meanwhile the bird is gone and there's nothing to be done anyway. "I just wish I'd seen it myself," Lowery said, "and then I wouldn't give a damn how many people questioned it."

But if he saw it, of course, no one would question it, which brings us back to Sykes' complaint about the whole thing: "What bothers me is that since the 1950s the people who have reported the bird haven't seen it well. They've caught glimpses, they've seen it but not heard it or vice versa. A glimpse isn't enough."

Gene Ruhr of the Office of Endangered Species, U.S. Fish and Wildlife Service,

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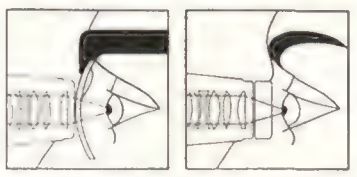

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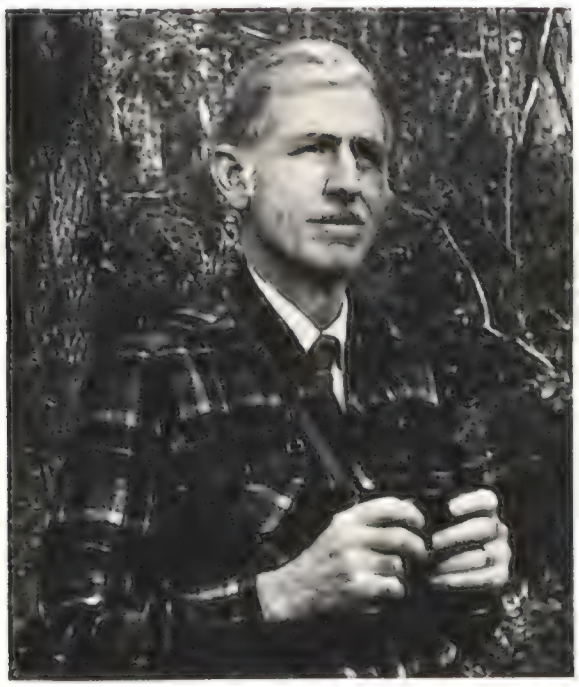
sees it as a clash between scientists and conservationists. Properly enough, scientists reject what won't meet the test of hard facts. And yet, if the bird is nearly extinct, what can one expect but fleeting glimpses? And if there is any chance of helping them, what else can one act on? Sykes thinks the bird may be very long-lived and that the reports grow from sightings of old single birds, doomed survivors which hang on hardily but are beyond reproducing themselves. Tanner thinks this reasonable, though he is dubious about any ivorybills being left. He thinks the best remaining habitat is the Apalachicola and Suwannee Rivers in north Florida, but he floated 70 miles of the Suwannee early in 1973 and saw no sign of ivorybills.

Dennis, always the enthusiast, thinks there are ivorybills surviving in Texas, Louisiana, Florida, Georgia and South Carolina. Lowery thinks there is—or was—a pair of ivorybills around the Atchafalaya swamp. Since Lowery's report, an amateur naturalist of some standing reported hearing an ivorybill call in the Santee River swamp in South Carolina, but the bird was never seen.

But Wetmore, out of his broad experience at the Smithsonian, may be most accurate of all when he considers the *ivorybill the equivalent of extinct*. There may be isolated birds about—but they soon will be gone. And as the men who know it pass on, interest in it will pass, too, and the ivorybill will be finished.



His evidence disputed, Dr. George Lowery lapsed into an irritated silence.

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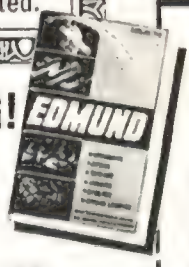

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Smith girls, classes 1975 to 1977, sit in a room at Haven House, one of the college dormitories.

By Liva Baker

The 'Seven Sisters' are celebrating their centenaries

When the top women's colleges were founded male educators snorted chauvinistically. Now young men strive for acceptance at Vassar

At the close of the 18th century it was declared that the ability to predict eclipses was less than useful to a woman who needed to know how to keep cream from feathering on a hot day. At the close of the 19th century the theory that one sex should live in intellectual poverty while the other prospered had died away.

The main reason for this change of attitude was the establishment of the women's colleges known as the Seven Sisters: Barnard, Bryn Mawr, Mount Holyoke, Radcliffe, Smith, Vassar and Wellesley. Today, so famed are the seven that only the highest qualified

Smith girls, class of 1905, sit in the same room as above left. Fashions have changed, but the wallpaper

is remarkably similar. Smith bought the residence in 1899, 28 years after the college was founded.

Radcliffe's modern Hilles Library is a well-lighted and well-stocked building for student study.

males can hope to share the courses they offer, either as coeducational or special students. Attitudes have come full circle—education for women alone is a curiosity.

As the Seven Sisters—some complete with male students, unrestricted social freedom and training for the full scale of human endeavors—approach their centennials, it demands a strange shifting of gears to explore their beginnings. The Civil War had thrust new responsibilities upon women, and there was a demand for them as teachers (of males, of course). Women inundated men's colleges, applying for admission. In the West, where prevailing winds had long been egalitarian and coeducation in the lower schools was standard practice, barriers to women's higher education were falling fast. Oberlin in Ohio had admitted women as early as 1837, followed by Antioch and the state universities in Utah, Iowa and Washington. By 1870 the list included the state universities of Wisconsin, Kansas, Indiana, Minnesota, Missouri, Michigan and, finally, California.

The East remained rigidly conservative. Admission of women even to lower schools was spotty and arbitrary, dependent on local attitudes. In an early gesture of tokenism, public institutions—including Cornell, whose peculiar quasi-public structure dictated the admission of women—slowly and reluctantly admitted a few, and women had long bootlegged lectures at Yale and Columbia, although both institutions refused to grant them degrees.

The standard for the prestigious private Eastern universities was set by that otherwise educational visionary Charles W. Eliot, who, on his inauguration to the presidency of Harvard in 1869, announced his unwavering opposition to the admission of women: "The difficulties involved in a common residence of hundreds of young men and women of immature character and marriageable age are very grave. The necessary police regulations are exceedingly burdensome." It was not, he declared, the responsibility of the Harvard Corporation to assume the task of judging the "innate capacities of women."

Amherst followed fair Harvard's example, as did Yale, Dartmouth, Williams and Brown—the last, however, ultimately letting girls in the back door by establishing a separate "annex" for them (Pembroke). Harvard itself later gave its blessing—but little cooperation—to a carefully chosen committee of Cambridge women, all immaculately clean of the taint of women's rights, who raised enough money to form an association for the "Private Collegiate Instruction for Women," purchase a house, hire a few Harvard professors and in 1879 open classes to 27 students. This was the "Harvard Annex" which Harvard refused to annex and which was chartered in 1894 as Radcliffe College.

It was clear that in the East a significant scheme of coeducation at prestigious institutions was out. If women were to be educated beyond the normal schools and "female seminaries" which then existed, it would have to be elsewhere. Not everyone agreed that a woman ought to have a college education at all. "Has she strength of brain enough to receive it?" asked a letter to the editor of *Godey's Lady's Book* in July 1870, articulating the doubts of many Americans. "Has she sufficient moral earnestness and energy of purpose to carry her through? Will thorough training do for her

Liva Baker is writing a book on the Seven Sisters for Macmillan. She is a graduate of Smith.

Radcliffe's library used to be in Fay House.
The college began as an annex of Harvard in 1879.

Vassar students—including males—often
study on the spacious lawns in springtime.

what it does for a man? Will it not destroy feminine grace and delicacy? Will it not break down her physical health? Will it give clearness, breadth, force and fertility to her mind; dignity, weight, refinement and symmetry to her character?"

The writer of that letter was John H. Raymond, president of Vassar, first of the Seven Sisters, founded in 1861. (Mount Holyoke, although founded in 1837 as a female seminary, did not become a full-fledged college until 1888.) Raymond was thoroughly persuaded of the merits of higher education for women, but most were not.

One visionary was Henry Fowle Durant, whose largesse was responsible for the creation of Wellesley College and who foresaw in his creation the beginnings of a women's university. Another was Joseph Wright Taylor, a Quaker physician who had long understood the need for women's education and left his fortune to the founding of Bryn Mawr.

Matthew Vassar, the Poughkeepsie, New York, brewer and benefactor of the college that bears his name, originally intended to endow a local hospital before he decided to finance a college "for young women which shall be to them what Yale and Harvard are to young men." Similarly, Sophia Smith, who donated her wealth to establish Smith College in Northampton, Massachusetts, had originally been encouraged to leave her fortune to Amherst. And Barnard College, which opened initially as the Collegiate Course for Women, was established only after a bitter struggle among Columbia's trustees and administration.

In 1889, somewhat more elaborately dressed,
two students study a landscape with their professor.

Modern geology field trip, complete with surveying rods, starts from Smith's administration building.

Each college's first four years—a proving time—were no less difficult. Physically, the institutions were not always completed by opening day. Tradition has it that the first Wellesley girls to arrive in their basques and bustles in September 1875 had to pull up their skirts and walk a plank to the door of the elegant college building because the front steps had not yet been set in place.

There was no dearth of student applications and many were rejected for lack of space. Girls had to fight skepticism, prejudice and constant reminders that higher education would destroy their chances of marriage. Among the adventuresome little group of strangers who gathered on a night in early September 1875 in Dewey House at Smith College, to get acquainted by the light of candles stuck in potatoes, there was one whose father had been warned he would have to buy her coffin before her diploma.

Some students could work quadratic equations but could not conjugate French irregular verbs. Others, vice versa. Most of Wellesley's 314 first admissions had not attained what was considered a college-level preparation. And the earliest of the Seven Sisters—Vassar and Wellesley—found it necessary to establish preparatory departments to maintain the standards of New England's men's colleges. (By the time Bryn Mawr opened in 1885, the increasing popularity of higher education for women had in turn increased the availability of preparatory education, and such remedial measures could be abandoned. Bryn Mawr, in fact, alone of the Seven Sisters, was able to establish a graduate school.)

Woodrow Wilson, a young associate professor of history with a crisp new Ph.D. from Johns Hopkins, noted, as he joined Bryn Mawr's first faculty in 1885: "I should of course prefer to teach young men, and if I find that teaching at Bryn Mawr stands in the way of my teaching afterward in some men's college, I shall, of course, withdraw."

Smith was able to recruit some moonlighters from nearby Amherst, and Mount Holyoke drew heavily on visiting lecturers from Wesleyan, Dartmouth, Williams and MIT to supplement the teaching corps of its own graduates. Harvard professors repeated their lectures

Geology field trip of the Eighties sets out from the same spot. The building was dedicated in 1875.

to Radcliffe students across the Yard, and Barnard's original agreement with Columbia dictated that the women's institution, whose graduates would receive Columbia degrees, use only Columbia or Columbia-approved instructors.

But not all of the seven were so fortunate. Vassar opened with a total of six advanced degrees among its faculty of 30, including President Raymond, LL.D., who, as was customary at the time, combined the roles of administrator, scholar and teacher. Wellesley's founder had imposed a particularly troublesome requirement on its college administration: an all-woman teaching staff at a time when qualified women were extremely rare. Nevertheless the college opened with a faculty of about 30 women, some college-trained, some self-taught.

What, these floundering institutions asked themselves, was a "thorough, well-proportioned and liberal education, adapted to [woman's] wants in life?" Matthew Vassar articulated this dilemma in a letter to a friend just prior to Vassar's opening:

"Shall a certain number of years of study, or a certain amount of attainments, be required for a Diploma?

"*How far* prosecute the Ancient Classics?

"Best means of Aesthetic culture?

"How much the Art of Conversation?

"Should *Dancing* be encouraged?"

The earliest of the Seven Sisters compromised. Departments were modeled on those of men's institutions, offering rhetoric, ancient and modern languages, mathematics, the sciences, natural history, history and political economy, philosophy and theology. To these were added courses in traditionally feminine accomplishments: music, drawing and painting. Gradually these last were dropped, at least as credits.

A universal prejudice a century ago, vigorously supported by physicians (priests in every home), was that woman, designed as a delicate reproductive machine, risked the future of the race by going to college. The Seven Sisters thus took every precaution to protect student health. They emphasized sound nutrition, good ventilation, simple dress. Wellesley girls rowed and exercised with dumbbells, Indian clubs and chest weights. Vassar girls played baseball, did calisthenics

and rode horseback under the direction of a romantic Prussian riding master reputed to have killed a man in a duel back home. Mount Holyoke girls took long walks, did gymnastics and played tennis. Radcliffe advertised prominently in its catalog the access, at no expense, to a gymnasium.

As the colleges floundered during their early years, so did the alumnae. Professional opportunities had not kept pace with educational opportunities, and prospects of marriage seemed to decline in direct proportion to the quality of a girl's education. One Midwestern farmer described the experience of his Vassar-educated daughters this way: "All the young men among the storekeepers or the rich farmers around, who might have been agreeable acquaintances, and that would have made good matches for ordinary girls —why, they have nothing in common with a girl that's spent four years studying Latin and Greek and history. . . . The girls don't take any pleasure in their company, and the boys are afraid of them . . . I guess I'll have a lot of college-educated old maids on my hands."

Students in those early days followed a monastic regimen of which Wellesley's was typical: 6 A.M. rising, three hours of recitation, three study periods of two hours each, one hour of required domestic work (sweeping, dusting, clerical work, filling lamps, waiting on table), one hour of outdoor exercise, two 20-minute "silent periods" for prayer and meditation (although the colleges were generally nonsectarian, all had a Christian orientation with required Bible-related courses and kept Sunday strictly as a day of worship and spiritual cultivation), lights out at 10 P.M.

The girls made time for play. Friday night at Wellesley was a gala evening when visiting lecturers, poets and musicians performed. There was the Beethoven Society and the Shakespeare Society. Students toured, properly chaperoned, of course, nearby historic sites or the recently opened Museum of Fine Arts in Boston.

The students proved their academic mettle early; Amherst professors who taught at Smith "affirmed that the average scholarship of the young women was higher in the same studies than in Amherst classes," President Seelye reported. "More restraints were needed for the diligent than coercive stimulants for the indolent." Accreditation came quickly, with the New England Association of Colleges and Preparatory Schools, on its organization in 1885, admitting women's institutions on equal terms with men's. National recognition followed when in 1899 President William McKinley accepted honorary LL.D.s at Smith and Mount Holyoke.

Even male chauvinism began to subside. The editors of *The Cornell Era* found themselves obliged to comment on the first issue of Vassar's student publication, the *Vassar Miscellany*: "There are a number of able articles which . . . evidence highly cultured minds."

As one educator admitted in 1894: "College education has not made woman either a blue-stocking, or a stick or a brute."

Smith girls of 1973 grace the stairway of Dewey House, above, a residence built in 1827. In the late 1800s, opposite, grandfather clock preceded the electric, and candle served as lamp.

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Book reviews

O'Neill: Son and Artist
Louis Sheaffer
(Little, Brown, $15)

More often than not in a biography that dwells on the psychology of its subject, the subject himself disappears in a chasm between jargon and supposition. Not so in Louis Sheaffer's monumental study of Eugene O'Neill, of which this is the second and final volume. O'Neill the man is always to the fore, exquisitely, painfully human, and the argument that O'Neill's character and art were formed in the crucible of early family relationships is not labored but left to the reader to hold in mind and to measure against the expertly researched but simply told story.

This book, together with its prizewinning predecessor, *O'Neill: Son and Playwright,* is based upon more than 15 years of research. Not only did Mr. Sheaffer have access to the O'Neill papers on deposit with Yale University, much of the material undisclosed or unpublished, he also interviewed all three of O'Neill's wives and had access to the papers of the last two. Then, too, there were the papers and recollections of O'Neill's surviving children and friends as well as the whole theater world to be mined. And, finally, Mr. Sheaffer did field research in almost every place O'Neill lived.

The danger in research so ample is that the sheer volume of material may prove to be an intractable mass of established facts and conflicting testimonies. But Sheaffer has avoided this pitfall. He has allowed the sources to speak for themselves—O'Neill contending with the others—to give vent to the play of personalities, providing flesh, blood and feeling to the career of the playwright and so, in the end, giving life to the man.

This second volume presents both triumph and tragedy. It takes O'Neill from his first Broadway success, *Beyond the Horizon,* to the pinnacle of fame as the avant-garde playwright of the New World, author of *Strange Interlude* and *Mourning Becomes Electra,* and on to the Nobel laureateship in 1936. But even as this ascending theme sounds, there are darker notes and dissonant chords. The years of O'Neill's artistic maturity are a chronicle of family deaths, broken marriages, rejected children, professional quarrels, financial stresses, frustrated theater projects and deteriorating health.

The O'Neill parents were charming but ultimately unpleasant people. Eugene and his brother Jamie were in the same mold, and Eugene's sons, though marginally less colorful, shared the family characteristics. All struggled with personal devils—drink, drugs, greed, success or

O'Neill and his wife Carlotta in 1938

failure; striking out at life, they injured those about them. Eugene was no exception, but he had the will to turn his prolonged crisis of existence into art. He appeared at a moment when the American theater was ready for change, sated with the diet of realism that had been provided by producer David Belasco. O'Neill's symbolism and seemingly radi-

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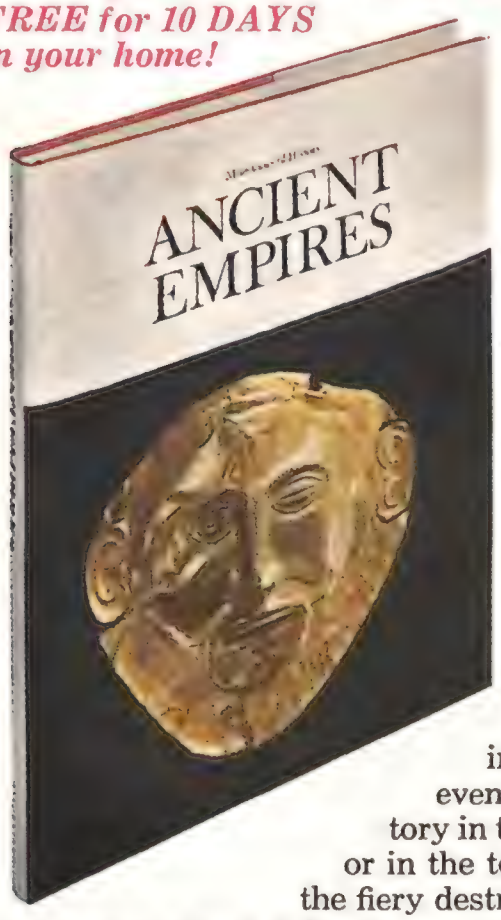

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cal stagecraft, much of it borrowed from European sources, created for the first time an open situation for American theater. In a personal sense, O'Neill moved theater full circle. To the public of his day, O'Neill seemed to personify unfettered, imaginative genius: magician, poet, prophet. For many of today's theatergoers, few works could be more compellingly realistic than the obsessive litany of pain pronounced in *Long Day's Journey Into Night.*

The Sheaffer biography strikes through all the masks to the man who felt that destiny was uncontrollable.

—*Gene Baro*
Critic and lecturer on American culture

The Stars and the Stripes: The American Flag as Art and as History from the Birth of the Republic to the Present
Boleslaw and Marie-Louise Mastai
(Knopf, $25)

Some years ago the authors of this book became fascinated by the fact that while the design of European flags was rigidly controlled by heraldic rules, the generalized specifications of the American flag initially allowed a great deal of latitude in determining the arrangement of stars, the number of stripes, as well as the overall dimensions (SMITHSONIAN, December 1973). Many flags, they tell us, were "not only homemade but home-designed as well. Americans had vied with each other in creating highly personal interpretations of their beloved flag—most of them unique, therefore—and in so doing they had been fully within the law. The strict regulations we now follow go back only one generation: during the earlier glorious epochs of American history, many variants of the Stars and Stripes were in simultaneous use."

The result was the development of what the authors call the "rarest and most exalted manifestations of American folk art" (such as gate on p. 54). That development is well chronicled in this book, which is richly illustrated with 255 color plates that help tell the story of the flag as an art form.

In their enthusiasm for this subject, Mr. and Mrs. Mastai have spent 30 years collecting, researching and interpreting old flags. Their personal collection forms the core of this volume, and they have drawn upon the holdings of museums, historical societies and other depositories

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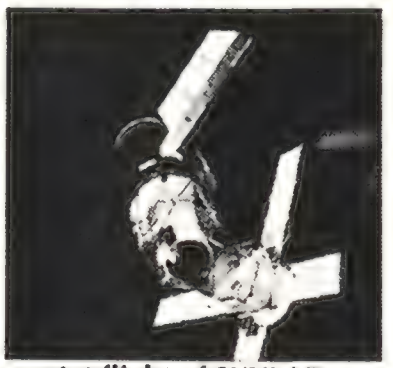

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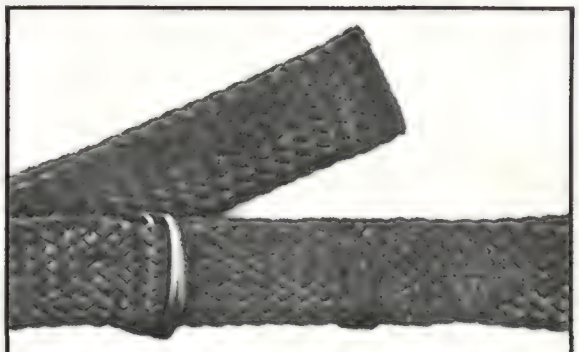

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to round out, expand and further illustrate their themes.

Besides the Stars and Stripes, Mr. and Mrs. Mastai discuss the first Centennial, flags in politics, daily life, song and in the Civil War, and the use of a female figure and of an eagle in patriotic illustrations. The title of the book implies more interest in the 20th century than is the case. Except for a few illustrations, the book ends with World War I.

One of the most interesting flags in this book is an improvised version supposedly made by a seaman on a Continental ship during the American Revolution. A finely woven piece of red twill formed the field and stripes of white silk ribbon were sewn on. Thirteen white stars are awkwardly embroidered on a blue wool canton. This "Prisoner's Flag" is an unpolished gem.

From both the artistic and historical points of view, this reviewer would have liked to see some discussion of fabrics, dyes and thread in these flags. Some mention of the locations and outputs of early flag companies would also seem to be in order. It is a pity that so handsome a volume is marred by some errors that were not caught in the proofreading stage. No doubt these are directly related to the fact that the book was printed in Italy. But these matters do not keep this book from being a treasure.

—Harold D. Langley
Associate curator, Division of Naval History, National Museum of History and Technology

Genetic Fix
Amitai Etzioni
(Macmillan, $7.95)

In the preface to this book, Amitai Etzioni says that a title he thought of, and rejected as frivolous, was *What Your Doctor Did Not Tell You, and What Your Congressman Does Not Know, About the New Genetics.* He goes on to say that the book is not about biology as such, but about the implications of genetic engineering, which he refers to as the genetic fix—"we can *now* tamper with our biological inheritance, both fix it where it went wrong and improve it."

Etzioni's concern, above all, is with "your right to know of opportunities and their consequences, your right to be in on the decisions now being thrust upon us, your right to decide if you wish to

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Science Weekend at the Smithsonian: Scientist-led visits to the Natural History Museum's Life in the Sea Hall and World of Mammals Hall, National Zoological Park, Chesapeake Bay Center for Environmental Studies, and the Smithsonian's Experimentarium—March 22-28.

California Channel Islands: Seven days aboard a 95-foot sport fisher as you study the notable bird and plant life on eight Channel Islands off California's spectacular coast—April 15-22.

San Antonio, Texas: The San Antonio Fiesta, a tradition since 1891, and its colorful, multicultural heritage—April 20-26.

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Summer Tours will include Santa Fe and Taos, New Mexico; Boston Art and Architecture; San Diego zoos; a Colorado River float; and a rescheduling of the Hawaiian Islands' petroglyphs tour.

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For information on specific tours, write Mrs. Rosa Mae Howe, Domestic Tours, Room SI 106 or Miss Bliss Schumann, Foreign Tours, Room SI 123, both at Smithsonian Institution, Washington, D.C. 20560.

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administer the genetic fix to yourself, your next child, and—with other fellow citizens—to the nation's biological inheritance and future."

As Etzioni shows, the ethical issues raised by recent biomedical developments are already with us. Setting aside efforts such as the growth of a human embryo outside the womb—an experiment that is being pursued actively, primarily in England—Etzioni shows that large numbers of Americans are now making biomedical decisions without proper information.

Whatever the case—birth control pills, abortion or screening programs for genetic disease—Etzioni is able to show that rather essential information is often being overlooked. (Did you know, for example, about the British study which found that the likelihood of second-trimester spontaneous abortions increased among women who previously had undergone induced abortions?)

Etzioni uses an effective format. He takes us through a three-day international meeting on biomedical ethics, paper by paper, annotating each presentation and pausing to record his reflections. The reader may be overwhelmed occasionally by the scientists' professional jargon—Etzioni sometimes was—but seeing the meeting through Etzioni's eyes will help the layman's understanding considerably. The fact that Etzioni is shaky in some of his facts curiously strengthens his argument: If an informed sociologist can make mistakes, what about the rest of us?

From Etzioni's account, few minds were changed at the meeting, least of all his. He went in thinking that there should be a committee of wise men and women who would exercise some social and ethical controls over scientific research, and went out thinking the same thing, even though many scientists are enraged at the thought of any outside controls.

This is an excellent introduction for anyone who wants to take part in such a debate. It gives few definitive answers, for there are few answers available, but it does raise all the right questions.

—*Edward Edelson*
Science editor, *New York Daily News*

The Architecture of War
Keith Mallory and Arvid Ottar
(Pantheon; $15 hardcover, $6.95 paper)

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Smithsonian Index

Covering Volume III—April 1972-March 1973
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gram, representing a stupendous expenditure of money, intelligence and energy, has been devoted to the black art of destruction. Doubtless this bitter irony accounts for our habitual response. Like Molière's bourgeois gentlemen who learns to his surprise that he has been speaking prose all his life, we have refused to consider the results of this enormous enterprise to be architecture. But why in the world not?

Authors Mallory and Ottar convincingly demonstrate that however ultimately foolish, the mammoth projects undertaken by Western European governments during and between the century's two biggest wars do indeed qualify in just about every respect—yes, even esthetically—as architecture.

Part of the peculiar fascination of this book is in the scores of striking photographic images that seem to prove the lasting influence of military architecture. Do not the concrete towers and gun mounts of Germany's Siegfried Line foretell both in technique and expression the so-called Brutalist style of much civil architecture in the postwar period? Does not the clunky classicism of the German submarine pens at Bruges during the first World War look forward to, say, the Rayburn Building? And those cement dragon's teeth of the antitank defenses in the ill-fated German West Wall, do they not show an alarming resemblance to latter-day park furniture in our cities?

Actually, as the authors show, esthetics is at best a secondary issue and stylistic influence little more than a coincidence of materials and techniques. More revealing is the fact that the military in many cases has proved more hospitable to the implications and uses of new technologies. Prefabrication, for instance, made its first major breakthrough with the British-made Nissen Hut during World War I. In response to a similar but even more massive shortage of manpower in England during World War II, prefabrication developed much further. Civil architecture still has not caught up.

The book stimulates a number of interesting questions regarding the processes and products of 20th-century civil and military architecture. It also provides a fascinating summary of the strategic, economic and political circumstances that shaped one of history's greatest episodes of building. That the structures produced were, in themselves, fascinating, is almost, but not quite, beside the point.

—Benjamin Forgey
Art and architecture critic of the
Washington Star-News

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Smithsonian highlights

Museum of Natural History
"It All Depends" is a major new exhibit on ecology, which has just opened. It dramatizes how all living elements in an environment are dependent upon each other for survival. Basic ecological concepts are conveyed through the use of dioramas, films, slides and graphic displays. Included are a tidal pool, desert niche and, at the center of the exhibit, a realistic, 54-foot-high tropical rain forest which gives the illusion of extending endlessly beyond sight.

Anacostia Neighborhood Museum
Representative works from the "Barnett-Aden Collection" will be shown through March 3. The Barnett-Aden Gallery was founded in 1943 to establish an opportunity for new artists to exhibit their works and obtain resources for study. Prominent in the highly praised private collection are artists who emerged from the period now referred to as the "Harlem Renaissance." Included in the exhibition are the paintings, prints and sculptures of artists such as William H. Johnson (see SMITHSONIAN, November 1971), Jacob Lawrence, Romare Bearden, Jacob Kainen, Edward Bannister, Henry O. Tanner, Elizabeth Catlett, Jack Perlmutter and Richmond Barthe.

Freer Gallery of Art
"Ceramics from the World of Islam" is a continuing exhibition commemorating the 50th anniversary of the Freer Gallery. More than 100 objects, ranging from the 9th to the 19th centuries, from Syria, Iran, Iraq, Egypt, Turkey and Spain are featured in this first major exhibition of Islamic pottery in the United States.

National Collection of Fine Arts
"Art of the Pacific Northwest: From the 1930s to the Present" is a major exhibition of 80 paintings, 20 sculptures and 20 drawings. Featured in the survey of four decades of Pacific Northwest art are the works of 45 artists, including Mark Tobey, Morris Graves, C. S. Price and Kenneth Callahan—opens February 8.

"Prints and Drawings of Herman Webster, 1878-1970" is a retrospective of 70 drawings, watercolors and prints by this American artist—opens February 8.

National Portrait Gallery
"American Self-Portraits" is a major exhibition of 109 works providing an in-depth study of a neglected area in American art. The show depicts 300 years of changing taste and fashion in portraiture and includes paintings and graphics by Benjamin West, Rembrandt Peale, George Catlin, Mary Cassatt, John Sloan, Thomas Hart Benton, Stuart Davis, Jackson Pollock, Robert Rauschenberg and Andrew Wyeth—opens February 1.

Thomas Hart Benton, *Self-Portrait,* 1970.

Puppet theater
"Pinocchio" continues in the Arts and Industries Building. Performances are on Wednesdays, Thursdays and Fridays at 10:30 and 11:30 A.M. and on Saturdays and Sundays at 11 A.M., 12:30 and 2:30 P.M. Children under three excluded. For ticket information, call (202) 381-5395.

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Luncheon facilities for Smithsonian Associates are in the original Smithsonian Building. Open Monday through Friday from 11:30 A.M. to 2 P.M., the Commons offers a buffet luncheon from $1.50 to $1.95. Also available are coffee and pastries from 10 to 11 A.M., and tea and pastries from 2:30 to 4:30 P.M. (Presentation of an Associates' membership card is required.)

Division of Performing Arts
"Theater Chamber Players at the Smithsonian" present an evening of music, including the first Washington performance of Ligeti's "Nouvelles Aventures"—February 4, 8:30 P.M., Baird Auditorium, Museum of Natural History.

"The Jazz Heritage Series" presents one of the most accomplished performers of American jazz, Lionel Hampton, expert on the vibraharp. The Lionel Hampton Quartet offers a free workshop preceding the concert—February 17, 4:30 P.M. workshop, Hall of Musical Instruments, Museum of History and Technology; 8 P.M. concert, Baird Auditorium, Museum of Natural History.

"Bach's *Clavierübung,* Parts I-IV" includes a marathon of six partitas, the Italian Concerto, French Overture, the Organ Mass and the Goldberg Variations in four successive concerts—February 22, 23, 24 and 25. All concerts, with the exception of the Sunday Organ Mass, are at 8:30 P.M., Hall of Musical Instruments, Museum of History and Technology; Sunday, February 24, concert at All Souls Unitarian Church, 16th and Harvard Streets N.W., Washington, D.C.

For specific program information on all events sponsored by the Division of Performing Arts, call (202) 381-5395.

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- Information on any museum in the world in advance of a visit there.
- Smithsonian annual report and other publications.
- Invitations (when in Washington) to exhibition previews and special events, including admission of a guest.
- Research service for questions about subjects related to the Smithsonian.
- A remembrance from the Smithsonian in the form of a commemorative object or work of art. Write: Contributing Membership, Smithsonian Associates, Smithsonian Institution, SI 118, Washington, D.C. 20560.

Traveling Exhibition Service
There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write: Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- Denver, Colorado—"Antwerp's Golden Age" (The Denver Art Museum, Jan. 19-March 3).
- Mt. Pleasant, Michigan—"Contemporary American Drawings (V)" (Central Michigan University, Feb. 2-March 3).
- Cleveland, Ohio—"The Avant-Garde in Theatre & Art" (The Cleveland Museum of Art, Feb. 2-March 3).
- Charleston, South Carolina—"Victorian Glass" (Charleston Municipal Auditorium, Feb. 9-March 10).
- Dallas, Texas—"Mexican Folk Art" (Dallas Public Library, Feb. 2-March 3).
- Macomb, Illinois—"Our Only World (II)" (Western Illinois University, Feb. 9-March 10).
- Fulton, Mississippi—"View from Space (II)" (Itawamba Junior College, Feb. 2-March 3).

Parking on the Mall
Metro construction has made parking on the Mall near the Smithsonian complex extremely difficult. All parking prior to 10 A.M. is restricted. The use of public transportation is recommended.

Come, make friends and memories on an S.S. Prince George Alaska Cruise.

A cruise on Canadian National's S.S. Prince George through Alaska's Inside Passage is 8 days of sheer splendour. An unforgettable blend of shipboard romance and camaraderie. Gourmet dining and wining. Fiords and mountains and glaciers and totem-poles and gold-rush towns all spread out before you as you sail north from Vancouver to Ketchikan, Juneau and Skagway, with calls at Wrangell and Prince Rupert on the way back.

This year, the Prince sails from Vancouver, B.C. every 8 days from April 26 to October 3. Regular fares start as low as $390 (Canadian funds) including accommodation and all meals. And there are discounts up to 30% on early and late season sailings.

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SM-4

Energy and Smithsonian

In November 1971, environmentalist Wilson Clark wrote in *Smithsonian* magazine that the looming energy crisis "has little to do with summertime difficulties of power companies or the political considerations of importing Mideast oil. It requires recognition of the fact that our energy resources are dwindling, the bitter realization that at some not-too-distant hour the party will be over."

Nowadays the headlines are filled with the names of new technologies that may—or may not—help make America self-sufficient in energy: names like fusion, coal gasification and solar power. *Smithsonian* readers are familiar with most of the new technologies because they have already been explored and explained in these pages. For a long time we've been interested not only in the problem—but in ways to solve it.

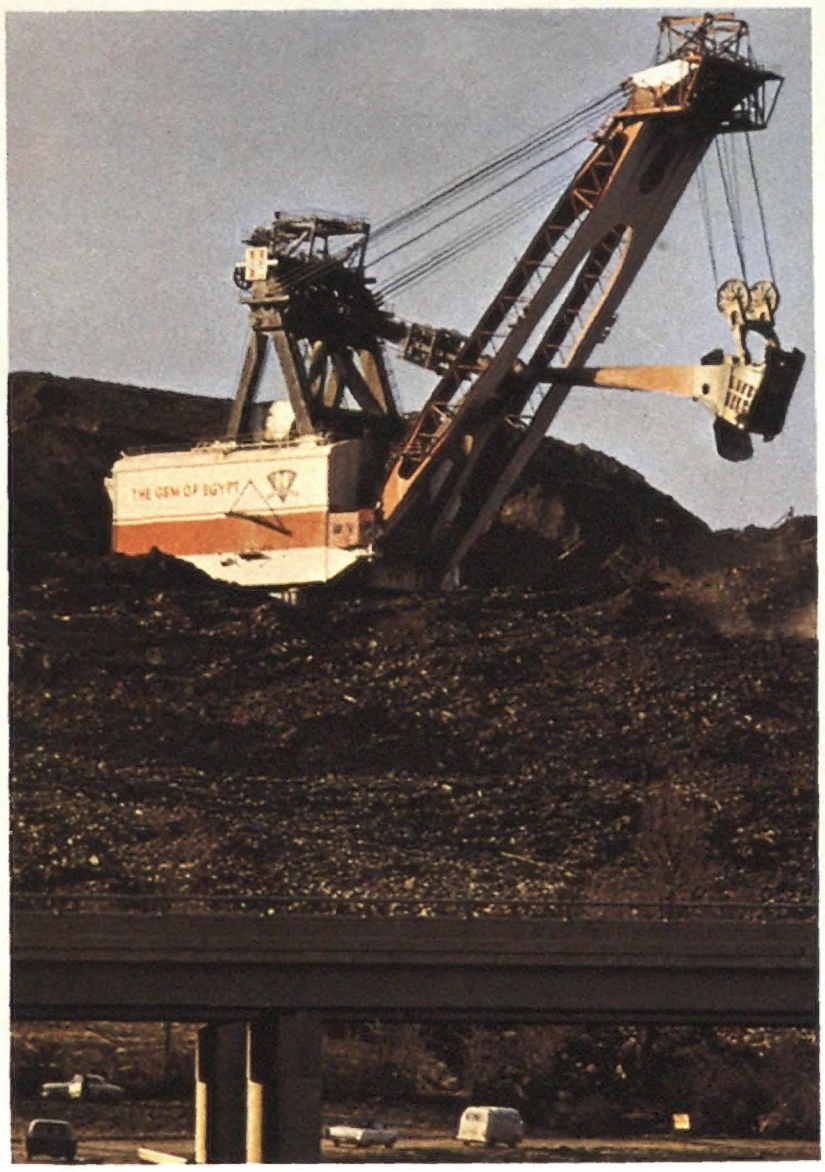
November 1970 As oil, the lifeblood of industrial civilization, spilled into the sea, SMITHSONIAN was aware that the Earth's supplies were finite.

November 1971 A Washington, D.C. house built 20 years ago is heated and cooled by the sun—just one of many answers to the question: Can man harness the sun?

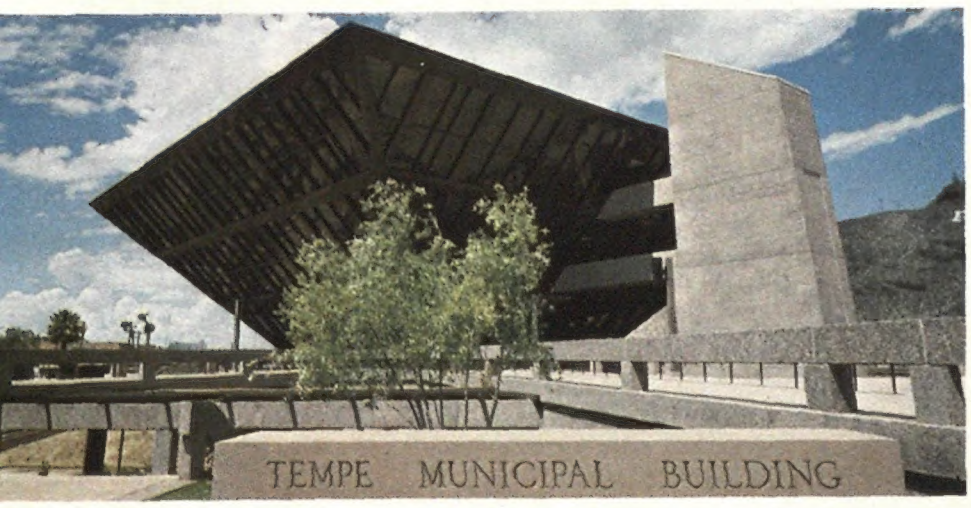
December 1972 No ordinary game of pool, this is a diagram of the fusion reaction, the principle of the hydrogen bomb. If scientists can tame it, we will power the world with a little bit of seawater.

Our readers have long known that the crisis was coming

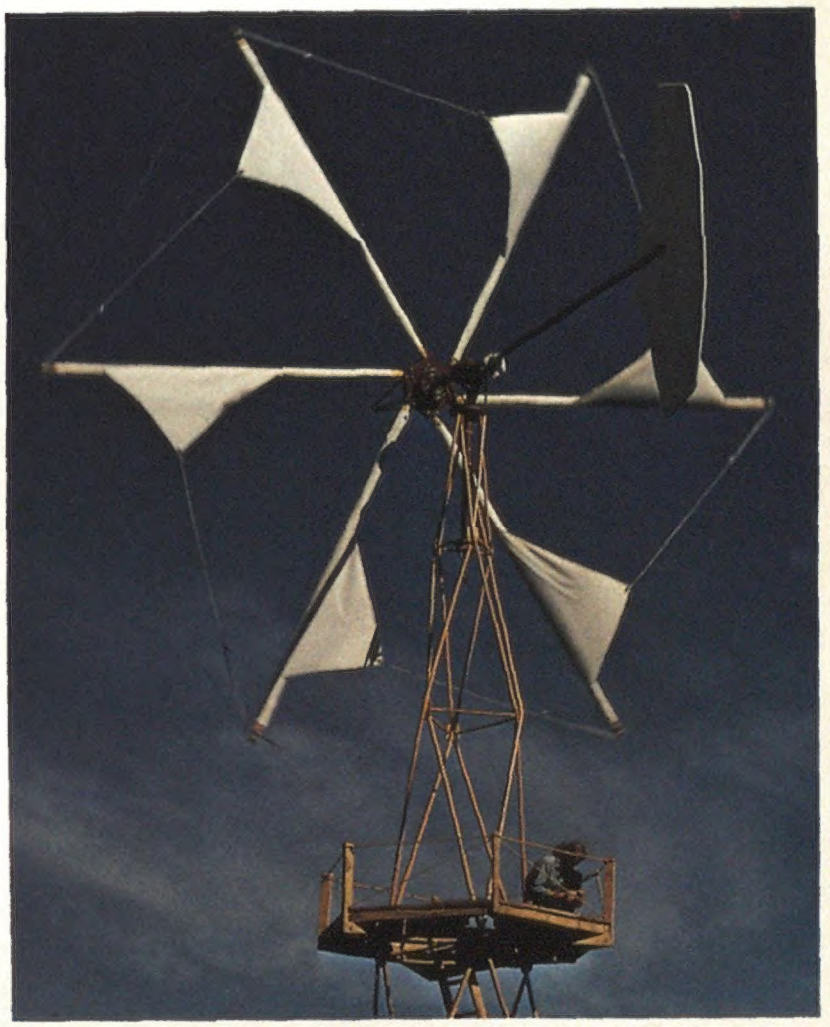
and we have told them about many of the solutions



February 1973 Coal may again be king but at high environmental costs. **October 1973** Conservation of energy can be built in by architects, as below.



There *are* ways to keep the party going and *Smithsonian* readers are among the first to know. Use the convenient response coupon below and give a friend a national membership in the Smithsonian Associates. Among membership benefits is *Smithsonian*, the magazine which celebrates Man's creativity and inventiveness, and which will continue to provide its readers with the best advice about keeping the party going.



November 1973 The wind is free and the old-fashioned windmill has been redesigned into a generator. Also, there are many ways to store the power.

Smithsonian Magazine
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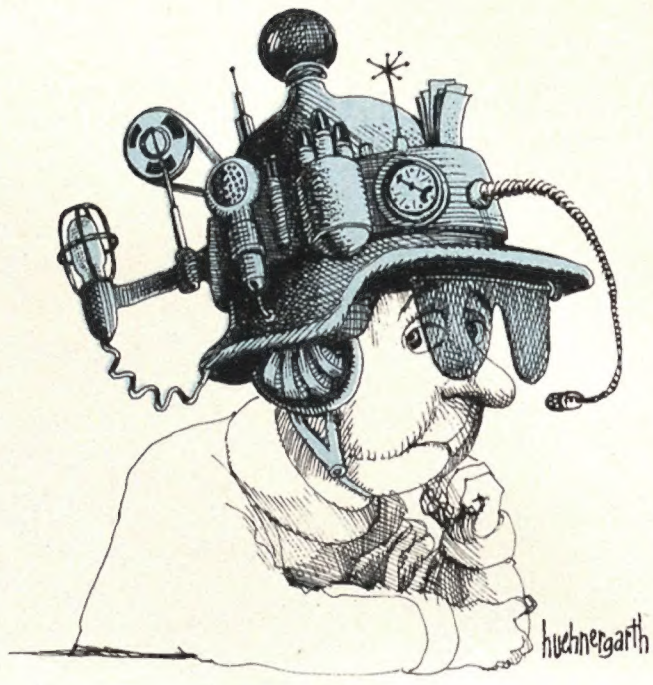
By Patrick Ryan

Put on your mod bonnet with the aerial on it



The transience of earthly glory was lately emphasized at an auction in Munich when the bidding failed to reach the reserve price placed on Adolf Hitler's hat. The highest bid that the auctioneer could raise was around $2,650, and he blamed a waning interest in souvenirs of high life in the Third Reich for its being so far below the reserve figure of $3,850. His experience might also reflect the sartorial fact of life that male and female hatlessness is now a fact of American life contributing to the poverty of Danbury, Connecticut, hatmakers.

If, like Yankee Doodle, *der Führer* had stuck the odd feather in his hat, although it might have diluted his Nietzschean image here below, such embellishment might have helped him make the reserve price posthumously.

Masculine hats, such as they are, still have an admirable versatility, being used for talking through in utter error, eating after unsuccessful wagering, passing around in the name of charity and tossing into a political ring. A man's hat serves also as a means of saluting funerals, an instrument for acknowledging national anthems, and a receptacle out of which rabbits may be drawn.

The history of Western man's headgear is broadly Euclidean. In medieval times, most gentlemen were content with a variety of conical hoods. In the 18th century, things took a triangular turn and the most popular scalp shelter was the tricorne, or three-cornered hat. The simple cylinder, in the form of the top hat, took over in the early 19th century and reigned until the hemispherical bowler, or derby, appeared in about 1850. The basic dome shape has persisted until today, constantly subject to certain cleft, pinched and expanded variations such as the trilby, fedora or sombrero.

After mentioning the sombrero, it would be ungrateful not to record that the hat which has brought the greatest cinematic, televisual and self-identifying pleasure to international multitudes is the scuffed Stetson of the American cowboy. There was sad wailing in many tongues when it was reported that the Stetson hatmakers of Philadelphia would cease their ten-gallon production. Cold fears abounded transatlantically that we would in future be condemned to watching John Wayne, Lee Marvin and Clint Eastwood riding off into the sunset wearing a fez, deerstalker or a beret. But good news has lately come to us that Stetson has leased its trade name to a company in St. Joseph, Missouri, which is again producing in profitable quantities that broad-brimmed headpiece to shelter from the prairie sun not only the wearer, but also his pinto and a little dogie or two.

The most fancy and formidable male hats have traditionally been worn by the military and the clergy. The compulsion of high-ranking military officers to encrust their caps with gold braid or "scrambled eggs" has led to their being described as "brass hats." Connoisseurs of brass-hattery have generally given the palm for the biggest, gaudiest and most over-decorated soldier's hat to the late General Douglas MacArthur; however they do admit that Italian colonels, Brazilian airmen and Las Vegas hotel doormen have lately been challenging his gorgeous-topped title.

Little notable effort seems to have been made by anyone to stimulate male hat inventors. Even so, an idle mind might seize the opportunity to ponder the ideal hat of the 1970s.

In our prevailing antagonistic environment, protective qualities must outweigh esthetic appearance. The head covering would need to be of some thick, reinforced plastic material capable of repelling acid-polluted rain, resisting nuclear fallout, and defying the bludgeons of muggers. Earmuffs would serve to keep out brain-battering 20th-century din, and a quick-release eyeshield would provide instant protection from riot gases. Equipment essential to modern living could be accommodated in a capacious crown, including litmus paper strips and a Geiger counter so that the wearer could ascertain if the atmosphere was safe enough for him to take his hat off. A miniaturized cassette player internally mounted would emit eternal Muzak to soothe overstrung nerves, a two-way radio would provide facilities for rapidly calling the cops and a flashing light mounted on top would enable distress signals to be passed to patrolling helicopters.

In short, the ideal hat for our inglorious age might well work out to be a solid-top, hi-fi, all-electric Stetson.

What we found in this Florida peanut field wasn't peanuts.

Up until 1970, Jay was a small, peaceful city on the Florida Panhandle where peanuts, soybeans and cotton were grown.

Visit Jay today and you'd still see a small, peaceful city on the Florida Panhandle where peanuts, soybeans and cotton are grown. Plus some new things which you wouldn't see unless you searched for them. Oil wells.

The Jay Field, which extends into southern Alabama, is the biggest oil discovery on the U.S. mainland in more than ten years. And it's now good for more than a billion gallons of oil a year.

The important story about Jay is not just the oil field. It's how an oil

field can fit into a quiet farming community without turning it upside down.

Before the field became operational, Exxon and other oil companies commissioned an extensive study of the existing environment around Jay. The quality of the water, the land and the air were all measured and evaluated. Today, Exxon uses these measurements as a guideline in the operation of all their Jay facilities.

We think this is a good example of how the oil industry can coexist with a rural environment. Because the oil from this field is needed to help meet the energy needs in America. And we're proving we can get it without messing up a way of life in Jay.

EXXON

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